TECHNOLOGY DEPT.

The TOOL ENGINEER

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In This Issue:

Small Manufacturers Can Profit by Tool Engineering
See Page 10

Broaching—When, How and Why
See Page 12

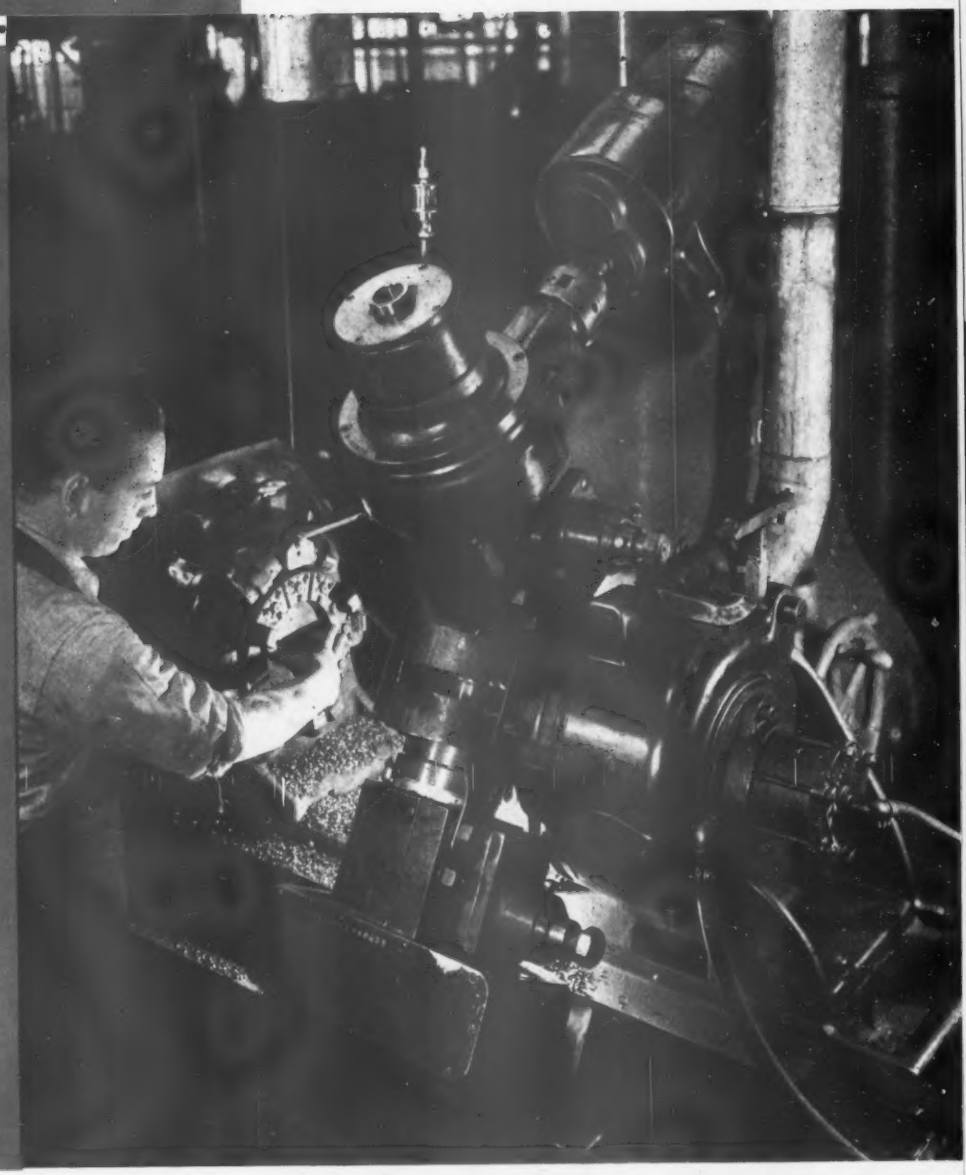
Inventiveness
See Page 14

A Tool Engineer's Impression of Japan
See Page 17

The Man Over 40
An Editorial
See Page 9

News of A.S.T.E.
See Page 20

"THIS MONTH'S COVER"
See Page 28



AUGUST
1937

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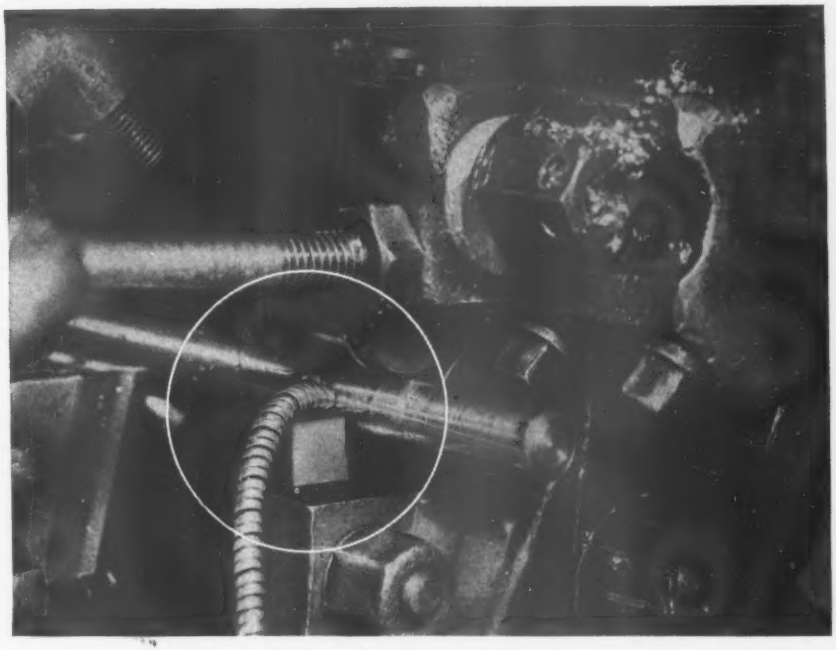

Turning a heat-treated nitralloy water pump shaft (235 to 269 Brinell) from 13/16 to 5/8 inch at 320 R.P.M. with Haynes Stellite J-Metal. Surface speed—70 ft. per min.; feed—0.0078 in. per rev.; depth of cut—3/32 in.

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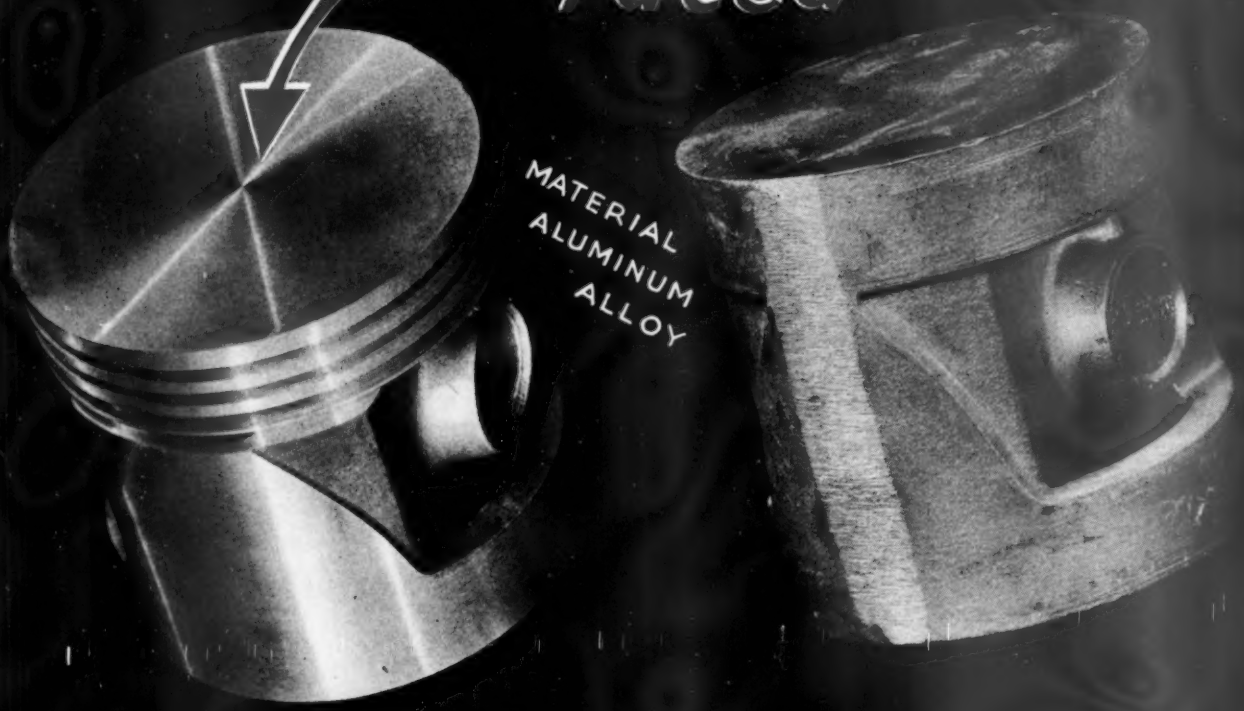

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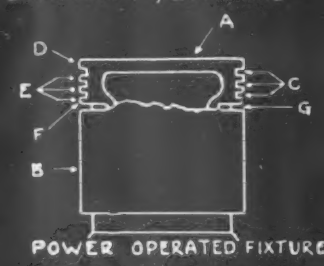
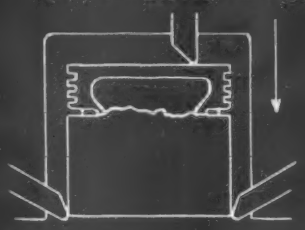


STATION 2
PLAIN VERTICAL HEAD



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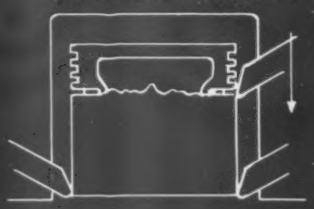
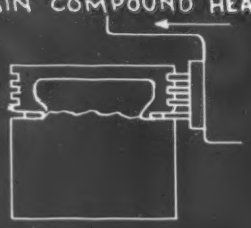


STATION 4
PLAIN COMPOUND HEAD



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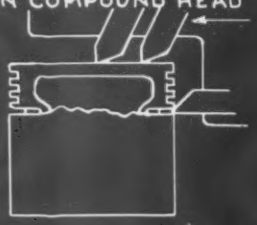

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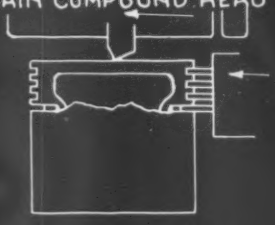

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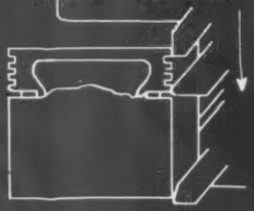
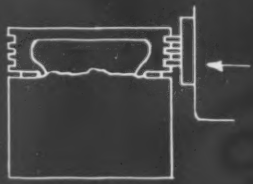
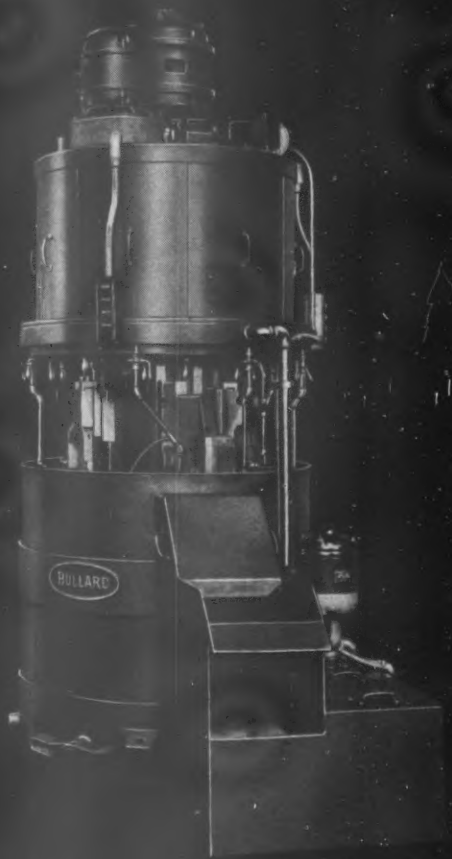
PLAIN VERTICAL HEAD



STATION 8
GROOVING HEAD





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Vol. VI AUGUST, 1937 No. 4

Contents This Issue

NEWS

Production Perspectives—News of Mass Manufacturing from Everywhere . . . . . 18, 48 and 50

A.S.T.E. Chapter News . . . . . 20, 39 and 48

TECHNICAL

Small Manufacturers Can Profit by Tool Engineering, by George Stennett . . . . . 10 and 40

Special High Production Machine for Countersinking, Drilling and Gauging, by John E. Wells . . . . . 11, 42 and 50

Broaching—When, How and Why, by William A. Hart . . . . . 12 and 13

Inventiveness, by Lev. Trofimov . . 14, 15 and 16

GENERAL

A Tool Engineer's Impressions of Japan, by Thomas Skove 17

A.S.T.E.

A.S.T.E. Chapter News . . . . . 20, 39 and 48

EDITORIAL

The Man Over 40, by A. E. Rylander . . . 9

FEATURES

Letters 9

New Equipment . . . . . 22, 24 and 26

New Literature of Interest to the Tool Engineer . . . . . 44 and 46

Try-Outs . . . . . 36 and 38

Handy-Andy's Workshop . . . . . 32 and 34

ADVERTISERS' INDEX 54

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Owing to the nature of the American Society of Tool Engineers organization, it cannot, nor can the publishers be responsible for statements appearing in this publication either as papers presented at its meetings or the discussion of such papers printed herein.

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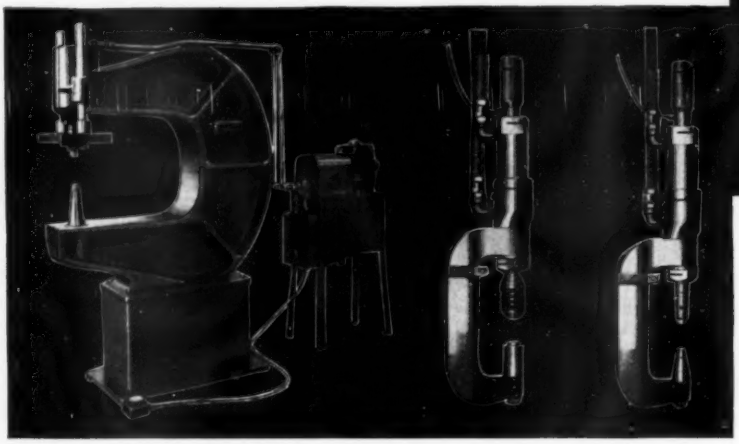

● 35 ton "Hy-Power" Hydraulic Punch and Riveter, adaptable to a variety of work. Ram has platen for mounting strippers or other fixtures. Stroke 6 in., gap 14⅝ in., reach 30 in. Time cycle 4 seconds.

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The Man Over 40

AN EDITORIAL

By A. E. RYLANDER

AN old theme, by now, but still affording enough new slants to be a provocative issue and a source of annoyance to those who, having passed that age, feel that their best years are still ahead of them. For the trained man, that is, and for those whose minds and hands are still flexible enough for new ventures. This much can be conceded, that had management as a whole recognized the value of skill and training that only years can promote, the present industrial unrest might have resolved itself into constructive rather than somewhat dubious projects.

However, the prospect for trained men is bright enough regardless of age, the mooted discriminations against forty-plus being so much ado about nothing. Training itself never ages, rather, it never gets old enough. We come into the world endowed with plus or negative talents, round them off with training and polish them with experience, then suddenly step out of the picture with the problems of life barely touched. That happens whether we're twenty or eighty. We have, on the other hand, a hue and cry over shelving men at forty and a counter hubbub about retiring them at sixty-five to make room for younger men. Try and reconcile these extremes.

Looking backward, any of us who have reached forty can recall when, as youngsters, we considered men of that age old, only to find that as we retained freshness of vision and tempered it with mellowing experience, age itself still hid behind the horizon. There is the same enthusiasm, the same eagerness, the quest for adventure, but these resolve themselves into constructive pursuits, not into transient episodes. And frankly, management recognizes these qualities. It has to, else it denies its own efficiency, management being largely selected from men over forty.

Those of us who have watched the rise of Wm. Knudsen, or who heard Boss Kettering speak at the recent A.S.M.E. meeting, must be impressed with the virile executive ability and creativeness of these men. And what of Ambrose Swazey, whose most outstanding work was done after forty? And Henry Ford, and Walter Chrysler?—and so on ad infinitum. We have but to consider the management personnel of any large industrial concern to realize that comparatively few men, in industry, reach the peak until near or over forty. The exceptions prove the rule.

There is ample room in industry for men over forty, especially as intensive tooling and production problems create a tremendous demand for trained men. And, training is not acquired in a day, nor creativeness and enthusiasm tempered with matured consideration of practical results. Only Time effects that balance.

Letters

Sirs:

Please send me any general data or information on the A.S.T.E. that you have available. I am especially interested in machine data sheets, and would like you to send me a sample. How many of these sheets are now available?

Sincerely,
A. Lindner
Methods Department,
Toledo Scale Manufacturing Co.

Full details have been sent you from A.S.T.E. headquarters. A S.T.E. Data Sheets are for members only. There have been seventy of these data sheets issued to date. More are being prepared. —Editor.

▼ ▼ ▼

Gentlemen:

Please send some information about your publication, and the subscription rates for one, or more years.

Thanking you in advance for this information, I am

Sincerely yours
P. B. Cox
P. O. Box 2
Marion, Indiana

"The Tool Engineer" is not sold on subscription. It is the official publication of the American Society of Tool Engineers and to be sure to receive it each month we suggest you make your application for membership in The Society.—Editor.

▼ ▼ ▼

Dear Sirs:—

I have read a number of your recent periodicals with great interest. It is the writer's opinion that it is one of the finest magazines of its type, because of its brevity and conciseness. Most other magazines are so voluminous that it seems like quite a task to go through them.

I am very much interested in the work of your organization and, while I know there is no Chapter in New York City, I frequently have occasion to go to Bridgeport, Conn., where I notice you have a Chapter.

I have been employed by the General Machine Company, Inc., since 1929 and since 1930 have designed all production tools used in the manufacture of the Electric Furnace-Man Automatic Anthracite Burner and other machinery manufactured by us.

From what I have read in "The Tool Engineer," I believe that I am eligible to join your Society. I have also had considerable machine shop practice, in fact, was practically brought up in a machine shop, have a high school education and night school courses in Columbia University.

Kindly send me particulars regarding membership in your organization and oblige,

Yours very truly,
General Machine Company, Inc.,
Frederick Kalmbach, Jr.,
Vice-President.

Details regarding membership in A.S.T.E. have been sent you. There will be a chapter of The Society chartered in New York City early this fall. We hope that you join with us in establishing a good strong chapter there.—Editor.

SMALL MANUFACTURERS CAN PROFIT BY TOOL ENGINEERING

By

GEORGE STENNETT

Tool Engineer, Service Division,
Chrysler Corporation,
Highland Park Plant

"To make an analogy . . . the Tool Engineer becomes the doctor; the part to be made, the patient; the . . . tool line-up, . . . the diagnosis." In event of a faulty diagnosis it is the Tool Engineer who gets buried . . . not the patient.

TO persons connected with the automobile and other mass production industries, Tool Engineering conveys a definite meaning, but as one travels farther afield it becomes evident that Tool Engineering as we know it is practically unheard of.

Possibly one of the reasons for this condition is that only the mass production industries could develop this phase of engineering, but since it is developed and has become a vital part of modern production methods, there is no reason why it cannot be applied to all classes of mechanical manufacturing.

As the main object of this article is an attempt to show how Tool Engineering can be profitably applied by the small manufacturer, little mention will be made of the highly specialized tooling and machines so common in the automobile industry; so with that objective we will outline what Tool Engineering is and its relation to manufacturing, after which its application will be more easily understood.

Where the Tool Engineer Comes In

When the shop or the Mechanical Division receives from the Engineering Department the blue prints of the part to be made is where the Tool Engineer's work commences and the problems to be overcome before the finished parts are accepted as O.K. by the Inspection Department depends to a large extent on the ability of the Tool Engineer. To make an analogy; from this point the Tool Engineer becomes the Doctor, the part to be manufactured the Patient, the operation or tool line-up to manufacture the part the diagnosis; the only departure from common custom being in case of a faulty diagnosis, it is the Engineer who gets buried, not the Patient.

Tool Engineering is the planning of a definite sequence of operations to be performed necessary to produce the required quantities of a given part with a minimum of expense. Obviously the quantity to be produced and the delivery schedule or time element are the governing factors, and with this knowledge the first consideration is the available equipment and the relative tool and labor cost. Efficient Tool Engineering does not always result in high powered tooling, for a job can easily be over tooled by concentrating too much on a low labor cost and ignoring the mounting tool cost; for example compare 10,000 pieces produced at a labor cost of $.05 per piece with a tool cost of $8,000.00 against 10,000 pieces produced at a labor cost of $.50 per piece and a tool cost of $800.00. The difference of $2,700.00 would be saved by the high labor and low tool cost set-up, so evidently labor and tool costs must be considered together.

Using Available Equipment

Now to consider the available equipment, because if Tool Engineering is to be practiced in a wider and diversified field, the Tool Engineer will have to work with standard machines and the special machine designed and built for a single purpose will be an exception. Usually in the smaller plants, we find machines such as drill presses, lathes, screw machines, and milling machines grouped together in batteries or departments and such grouping may have some advantages, but a study of this condition by a competent Tool Engineer will soon reveal that independent groupings such as a hand screw machine, drill press, and milling machine will permit the operations on two of the machines to be performed on the time of the third, at the same time reducing the stock handling. If the machines are motorized, the expense of moving machines to suit different conditions is often justifiable and a motorized department becomes much more flexible and adaptable to repeated rearrangement.

Double Duty Tools

When a Tool Engineer becomes familiar with the different types of parts to be manufactured, the design of all tools, especially the jigs and fixtures can be developed with the thought of adapting the same tools to other parts, and if the fixtures are constructed with removable unit locators, adjustable clamps, and plenty of clearance around the part, it is surprising how many different parts one fixture can accommodate. A further development along this line is the construction of magazine type tool blocks so that with the right spacers any combination of tools can be arranged for multiple turning. The purchase of adjustable multiple spindle drill heads provides an easy solution to many drilling and tapping problems as they can be set up in less time than the arms and spindles can be arranged on most multiple drills, at the same time permitting the job to be done on a single spindle machine which represents less investment, occupies less floor space and needs less power to operate.

To obtain the most efficient results from any tooling, the speeds and feeds must be correctly determined and established by the Tooling Division; the practice of permitting the job setter or foreman to do this unless they are fully qualified and cost conscious often results in

(Continued on page 40)

SPECIAL HIGH PRODUCTION MACHINE FOR COUNTERSINKING, DRILLING AND GAUGING

By

JOHN E. WELLS

Ex-Cell-O Corporation

Detroit, Mich.

A GENERAL inspection of the average high production special machine, seldom reveals the primary reason for its existence. The savings in labor cost per piece made possible by a new method of manufacture as compared with previous methods, is always an important factor. A careful study should be made to analyze the advantages and their influences, both present and future, before the actual purchase is approved. Many times the real reason for making the change is overshadowed by the results that can be obtained by a minor improvement, with the result that the major reason is not given the proper consideration or is overlooked entirely.

The special high production machine illustrated below, is a typical example of this type of application. The part to be machined—a connecting rod bolt of .35 percent carbon steel; the operation—drill cotter pin hole.

For several years prior to the purchase of this special machine, this operation had been handled on an individual sensitive drill press with an average production of 600 pieces per hour per operator. If savings in labor was the only consideration, it is doubtful if a special machine would have been thought of, as the sensitive drill press investment is low and the machine maintenance and tool cost negligible.

The major difficulty encountered when using the drill press method, was the inability to hold the pitch diameter of the threads which were chased on the bolt after the cotter pin hole had been drilled.

The error in the threads was caused by the hardening of the burr around the edge of the cotter pin hole at the leaving end of the drilled hole. This was caused by the heat generated, due to lack of coolant at the bottom of the hole, when drilled from one side only, plus the sudden inrush of coolant when the drill broke through.

This hardened portion of the bolt around the cotter pin hole, resisted the thread cutting to such an extent that it was necessary to cut the balance of the thread undersize to permit it to pass the thread gauge inspection.

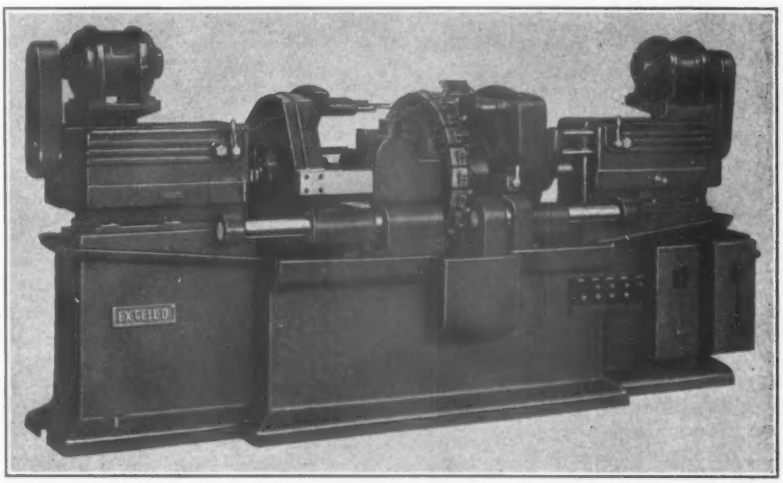
In order to eliminate the hardened section around the cotter pin hole, it was necessary to countersink both sides of the bolt and then follow up with drilling operations from both sides to complete the hole. It was undesirable to handle these operations in this manner on a drill press, so it was not only necessary but later proven more economical to build a special high production machine to handle the new sequence of operations.

The machine designed and built for this job is a two-way horizontal hydraulically operated and controlled multiple drilling machine. The operation consisted of cutting a 1/32" chamfer on each side of the bolt and then drilling the 1/8" diameter hole by two steps from one side and one step from the opposite side, and finally gauging the finished hole. The machine is automatic in all of its operations, as it is impossible for the operator to watch each individual operation as he could on the hand equipment.

Hydraulic power units are mounted at each end of the machine for driving and feeding the multiple heads required for the countersinking and drilling operations. Both units are interlocked to prevent mistiming on the work cycle. The control handles are left on each unit to assist in setting up the job. These units are compact, self-contained, electrical motor driven and hydraulically operated. Adjustable dogs control the rapid approach, feeds, return and stop. They are provided with two forward feed rates, independently adjustable from the side of the unit, permitting selection of the proper rate while the unit is in operation. A dwell is provided at the end of the stroke on this application, but it can be arranged at any point in the stroke by an external or internal stop. The spindle speed can be changed through the speed gears which drive the spindle from the hydraulic pump shaft. These units can be mounted vertically, horizontally or in an angular position, which further increases their flexibility.

The multiple heads on this ma-

(Continued on page 42)



Special automatic machine developed for countersinking, drilling and gauging cotter holes in connecting rod bolts. The advantage of this machine is that it makes it possible to maintain size and pitch diameter when threading the bolts on the next operation.

BROACHING—When, How and Why

PART II

This article by Mr. Hart represents the second and concluding installment of a synopsis of a talk on broaching given before the Milwaukee Chapter, A.S.T.E., June 10th. The first installment appeared in last month's issue.

By

W. A. HART

Member A.S.T.E.

Chief Engineer, Colonial Broach Co.

AS old as is the history of broaching, only the past decade has really seen it come into its own as a basic process for accurate low cost mass production. Until a few years ago resorting to broaching for any given job was more often than not an after-thought.

Today, the application of broaching in the best plants starts in the engineering departments. Production men know that to get the most out of any process involves the necessity of designing the part for that process. More and more engineers are recognizing this and are taking it into account in design work in cooperation with tool engineers, broach manufacturers and production men.

So well has this cooperation worked out in advancing broaching knowledge and developing broaching equipment and broaches for thousands of different jobs that today there are few places where broaching cannot be successfully applied.

Broaching is used today for instance in almost every type of job formerly allocated automatically to the milling machine. That does not mean that broaching has obsoleted milling. Whether it will do so in future, only time can tell.

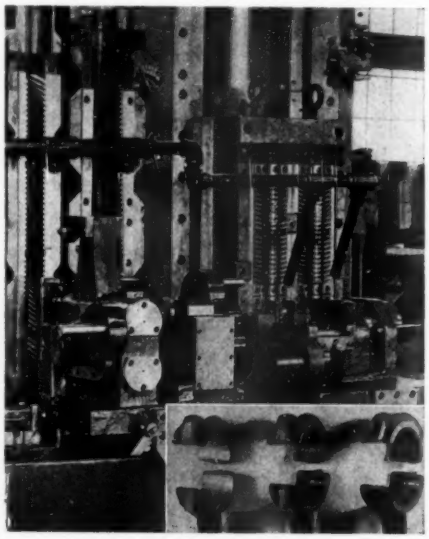
Again, broaching is being used because it is faster and cheaper for the cutting of even such parts as gear teeth, while large threads—represented by spiral splines—are being broached today in increasing numbers.

On the other hand, broaching has been recognized as the most accurate means of cutting such highly delicate parts as bearing-liners with their extremely close tolerances.

For the finishing of smaller parts, too, where several operations must be performed and the least amount of handling with minimum number of operations is desired, broaching has proven an ideal process.

Selecting Equipment

The selection of proper equipment for each specific job to be done of course depends on a large number of factors. Tonnage required, production per hour needed, life of broaches between sharpenings, metal removal involved, material to be cut, permissible floor space, permissible tolerances, nature of cutting job, etc. are all involved.



Connecting Rods are broached in stages shown on this Colonial Dual Ram.

Basically, the selection of the type of equipment to be used starts with the broach design—for in broaching perhaps more than in any other process, the machine best suited is the one which best handles the broach designed for the job in question.

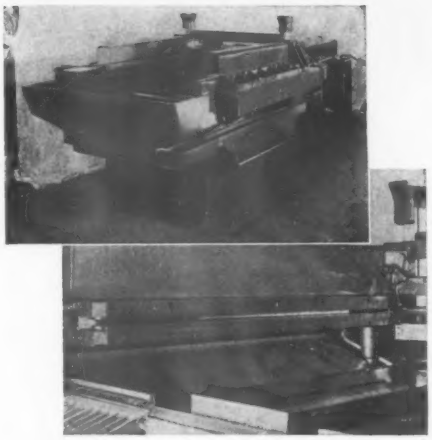
The recognition of this factor, years ago, led to the widespread designing of special machines for almost every job, retarding broaching due to the high capital investment involved. Today special machines are still needed here and there. 90 percent of all broaching operations however can be taken care of today with standard machinery developed through an intimate knowledge by broaching cutter manufacturers of broaching needs and broaching history in industry.

Thus, for broaching holes there are any number of standard machines available. Light duty, medium duty and heavy duty models, push types and pull types, all in various tonnages and stroke lengths, etc. At Colonial Broach alone there are available some two dozen standard models of broaching machines specially suited for hole broaching. These are built around five basic types, two pull types and three pushers.

Surface Broaching

Some of these models are also suitable for surface broaching applications, depending on the nature of the job. In addition there may be used for surface broaching standard single or dual ram vertical machines, or horizontal types (Colonial lists some 30 more basic types and sizes) depending on the requirements of the job.

Each type and size of machine has its own peculiar advantages and similarly its own limitations. One of the most interesting modern machines perhaps is the "Universal" horizontal, a machine designed for moderate-production runs of almost any type of job that may come up—



Automatic Magazine Feed Broaching of Seat Adjuster Rods. Below—Details of Broaches used.

hole or surface. It has been applied to such typical jobs as:

1. Broaching all teeth on a 6 inch pitch diameter C. I. washing machine gear quadrant from the rough —125/hr.

2. Broaching 20 slots $1\frac{1}{16}$ in. deep by .153 in. wide with .0002 in. tolerance on 30 speed reducer rings per hour.

3. Broaching half rounds, contact faces, etc. of several sizes of diesel engine connecting rods—90/hr.

4. Broaching 23 2½ inch pitch diameter spiral internal splines (using a spiral drive broach bar)—100/hr.

With follow rests for long broaches, large face plate capacity and a variety of broach puller options, etc., there are few jobs this machine cannot do.

Having the advantage of lower floor space, vertical machines are today widely used in surface broaching operations. Single ram machines are found on such jobs as:

1. High production connecting rods, including finishing of joint faces and ½ round—100/hr.

2. Broaching 5 surfaces on 150 transmission mainshaft bearing retainers from the rough, per hour, using a hydraulic automatic shuttle fixture.

3. Broaching transmission shifter forks complete in two operations on one machine at the rate of 120/hr.

A similar high production machine for use where more operations are required on the same piece or larger production is demanded, using only one machine, is the Dual Ram, on which the two rams travel in opposed cycles (180 degrees out of phase). This permits loading for one ram while the other is cutting. When applied to connecting rods for instance this machine makes possible three operations on a single machine producing 100 complete caps and rods per hour. Other applications include such jobs as:

1. Cutting cross and T-slots in forged steel steering gear shafts with hydraulic fixtures—180/hr.

2. Broaching contours of yokes and half round holes in universal joint parts—300/hr.

3. Broaching 1200 universal joint trunnion bearings per hour (No. 1315 hot rolled bar stock).

4. Heavy duty broaching of steering knuckles, both yokes and brake drum ears at the rate of 180/hr.

Another type of machine suitable for surface broaching is the Utility Press. This type of machine has been selected at Colonial for such jobs as spiral broaching of external gear teeth on window regulators, multiple broaching of brake shoe cams—four pieces at a time; etc.

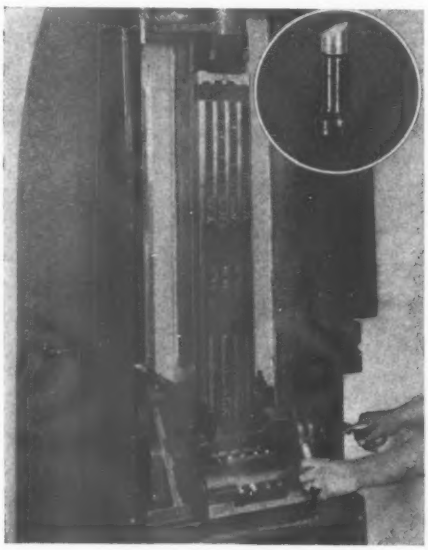
In higher tonnages this machine works out well for swedging pocket gears with involute form swedges, producing serrations in tapered holes with serrated drifts, etc.

Vertical pull-type machines have become increasingly popular for broaching holes. Equipped with automatic pullers to eliminate broach handling they are used in a wide variety of applications.

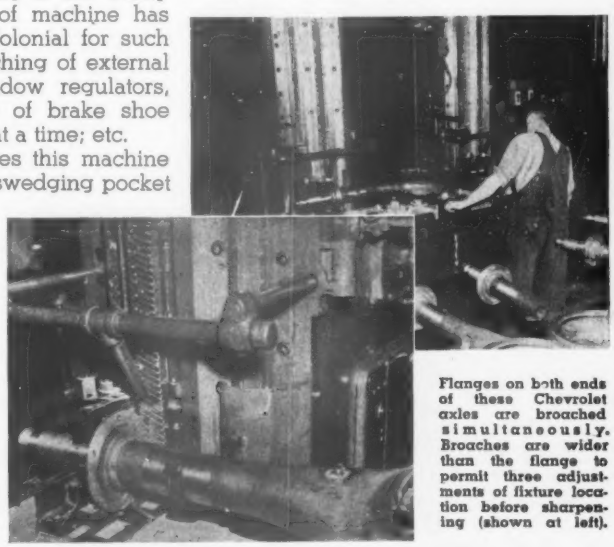
At left—Colonial Utility Broach used for broaching harmonic balancers. Above—Four broaches assembled in fixture for broaching harmonic balancer holes—latter is shown above the fixture.

Power presses running up into high tonnage capacity have been developed for extremely heavy duty broaching. These presses are designed with open fronts and backs for installation of large fixtures. Simultaneous broaching of a dozen clutch plates or broaching of very large internal gears presents no problem.

More broaching applications are still found in the automotive than in other industries, today. The automotive industry with its extreme production has been the leader in the development of broaching. However other industries are rapidly following suit, now that equipment is available for broaching virtually anything from watch parts up to large metal surfaces.



Left—Broaching two cam surfaces on four brake linkage parts simultaneously on a single ram machine. 700 per hour with tolerance of .001 in.



Flanges on both ends of these Chevrolet axles are broached simultaneously. Broaches are wider than the flange to permit three adjustments of fixture location before sharpening (shown at left).

INVENTIVENESS

". . . it is not clear to the man of industry that the greatest source of profit lies in the creative power of the employee. If this power is properly handled the results are more than gratifying; but, if it is mismanaged, the business could be wrecked over a short period of time."

LET me tell you how I became interested in Inventiveness. In 1922 I obtained work in an experimental laboratory as a "development engineer." At that time nobody knew what a development engineer was. I went to the Case School of Applied Science to inquire how many development engineers they graduated and what it was. They had never heard the name and knew nothing about it. Later I discovered that the term "development engineer" was the dignified name for an industrial inventor. I also discovered that the successful development engineer was not necessarily a college graduate. My employer never went to college and yet he had been performing his duties excellently. In about three years an internal revolution occurred in our company and the head of the development laboratory left with the people who left the company. I became the head of the department. This is the thought that came to my mind: "My job, from now on, is not only to develop new machines; but also to manage the department. What are the methods of management of this kind of department?" I saw a big difference between my department, and a machine shop. A machine shop produces tangible articles, while a development department, to my way of looking at it, is producing intangible IDEAS. That is where the difference lies. If the products are different, there must be a difference in management.

It is one thing to be in charge of a machine shop, whose functions are physical, and it is an entirely different thing to manage a designing, engineering development or research department, whose chief operations are mental. The physical operations of the machine shop, such as drilling, machining, grinding, polishing, assembling, etc., are known and can be carefully and efficiently planned. We can discuss each elementary operation trying to make it as efficient as possible. This planning and management is possible because the finished product is a tangible thing.

IDEAS—The Product

It occurred to me that unless an Idea, which was the product of my department, is a result of a series of definite mental operations, easily recognizable and controllable in some way—an intelligent management of the department is impossible. Therefore, I decided to find out all I could about the mental processes resulting in a technical idea. For twelve years I had an excellent opportunity, not only for self-observation, but also to watch all the men working in my department. That is how and where I became interested in inventiveness.

I have found that in the field of facts there are only two fundamental types of problems: discovery-type problems, leading to discovery, generally known as research problems—and invention-type problems. This discovery-type problem requires the finding of the cause of known effects and its general procedure is the well-known Scientific Method. The invention-type problem requires the production of desired effects from known causes and is opposite in mental direction, to the Scientific Method. There can be but two types of problems because there are but two great principles in the physical world, cause and effect.

Discovery vs. Invention

The inventive procedure is different from the Scientific Method because discovery differs from invention in these respects: Discovery is analytic while invention is synthetic; the discovery-type problem has one solution while the inventive has several; discovery is a statement of the cause while an invention is a tangible object, producing effects; to discover means to find, while invent means to make; discovery is a permanent contribution, while invention is a temporary one. Now what is inventing and inventiveness? Inventing is mental activity, or an elementary and natural process through which our mind automatically passes, whenever we are confronted with a situation which requires such action. In other words, inventiveness is a natural property of the human mind.

It is generally believed that in order to be an inventor, one must be a genius, or at least, one must possess that peculiar property of the mind, inventiveness, which is given to one and not to the other. Consequently, and quite logically, the teaching and deliberately planned management of inventing is impossible under this assumption. This regrettable popular misconception perhaps originated from the confusion of two notions which are not the same. They are: A property of the mind—inventiveness—and a product of this property—invention. People usually confuse inventiveness with invention, using these words in conversation as if they meant one and the same, when in reality, inventiveness is a mental characteristic, while an invention is a physical article. Exclusive possession of an invention, granted and safeguarded by patent rights, led us to think of inventiveness as an exclusive possession. Every normal human possesses creative faculties. If this property is applied to the field of literature, art, music, etc., the results are original novels, great pictures, and unique songs. Whenever this creative property of the mind is applied to the needs of the technical field, the result is an invention. If there are such things as techniques of writing, painting, and composing, there must also be a technique of inventing. If journalism, art, and music can be taught, and we know they can, there is no reason in the world why inventing cannot be taught and managed.

We have different interests, preferences and accumulations of different kinds of knowledge. You cannot make an inventor out of a man who dislikes machines in general, or knows nothing about them, But this does not mean that he has no inventive ability. If a man never was seen driving a car, it does not mean that he does not own one. He may have a beautiful car in his garage, but he is not using it, perhaps on account of fear or a dislike of driving.

Some people do not know they

can invent. I once had a man working in my department who was convinced that he could not invent. In fact, he did not invent anything up to a certain time. He was, however, a valuable routine research man and we needed him as such in the organization. He could find out facts about anything we wanted and present the information in the best possible way, but never could he do anything with this information in the way of applying it to an invention. He had no "ideas" as we say, and moreover he firmly believed that he could not have any. Whenever there was an opportunity I preached the theory of inventing to him and finally I gave him a definite inventive problem to solve.

I asked him to put down on paper all the possible solutions he could think of (I also told him how to do that) regardless of how good or poor they might look to him. One day he came to me visibly excited. "Something unusual here," he said, pointing to himself. "What?" I asked. "An idea," he answered, "and a good one." He was right. He had a very good and practical idea. But the most remarkable thing about it was that from then on, he was a different man; he had practical ideas whenever he was confronted with situations requiring inventive reasoning. I believe this accomplishment was entirely due to the fact that, first he tried, and second, he succeeded in organizing his thinking for inventive purposes.

Poor Inventor—Good Salesman

It does not pay to make a poor inventor out of a good salesman. I am often asked if I believed that a person who has shown no aptitude for inventing could be taught inventing. In connection with this question it is more important to understand that there is no need in teaching this kind of person while thousands who repeatedly have shown their inventive ability, remain without training. Keen desire for inventing is one of the most important signs of inventiveness. There are so many persons who want to know how to invent, and have done some inventive work, that the question of training a person who has shown no aptitude for inventing is superfluous. Truly, even a person with pronounced inventive ability, but having no desire to invent, belongs decidedly to the group which cannot be trained. It does not pay to make a poor inventor out of a good salesman.

Our minds, as our hands, need tools, to do more and better work. I hope I can show you tonight that by using a certain mental device you can help yourself in your work tomorrow. This device will make you think in several directions instead of one (as we all usually do) and will suggest to you more than one way of solving your problems. This device I call QQSTH device. The initials mean: quality, quantity, space, time and human element. I shall show the use of this device on a concrete problem.

The QQSTH Device

Suppose you were told that a bearing on a certain machine has failed and it is up to you to make suggestions to remedy the trouble. We assume that the failure was due to the fact that a designer made an error in his calculation and specified a bearing which is not strong enough to carry occasional overloads. I want to show with this example that there will be at least five practical suggestions corresponding to the five initials in our QQSTH device.

The trouble may be remedied by using a better make and more expensive bearing which will stand the overload. This suggestion I call quality type idea of solution because it demands the change in quality.

The trouble may be also solved by using two bearings in place on one. In this case the bearing will be the same as specified originally. This suggestion I call quantity type idea of solution because it demands the change in number. Mr. Ives told me that he had solved an annoying problem while developing the new and better type of contacts for ignition by using one contact instead of two, which is also a quantity type idea of solution.

The trouble with the bearing may also be solved by using a larger bearing. This I call a space type idea of solution because it demands change in space or dimensions.

In case the bearing originally specified was the best money could buy and space limitation does not permit the use of two, or a larger bearing, the trouble may be remedied by replacing the bearing after the specified number of working hours. Such replacement I call time type idea of solution because it involves and depends upon time.

The fifth possible suggestion may be this: to make a signaling device of some kind capable of giving warning to an operator by light or sound that the bearing is near a failure point. This suggestion I call a human type idea of solution because it involves human attention. I claim that every idea of solution in any field of engineering can be identified under one of the five types. I also claim that you in your own work can deliberately make yourself think along these five directions, and, therefore, find more than one solution of your problems and select the best one.

This mental device can also be used for collecting information on a technical problem. In order to show how it works and what it does I will tell you about my experience with it. One of our routine jobs in the development department is collecting all available information on a problem. Although it may seem that this is a very simple matter; I am sure you appreciate the difficulty of collecting such information, and also, the fact that the whole process of solving a problem in inventing, depends entirely upon that seemingly unimportant procedure: collecting information on a problem. Therefore, in our work in the development department we make all possible efforts to carry on this part of the development, to the best of our abilities. One day I decided to test the usefulness of the QQSTH device.

A Test

I had two men, Mr. White and Mr. Brown, working for me. Mr. White was definitely a better man, because he had a better education and more experience, than Mr. Brown. We were assigned to obtain all the possible information on a problem that had just arisen. I simply asked Mr. White to get all the "dope." After that I called Mr. Brown and told him approximately this: "We have to get the information on this problem. I want you to get 'the dope' independently from Mr. White. I shall tell you how to do this work. Make up a list of questions that you think you have to ask about the problem. Divide your questions into five groups.

"The first group will be of quali-

A paper presented before the Chicago Chapter of the American Society of Tool Engineers.

By

LEV. TROFIMOV

School of Inventive Practice
Cleveland, Ohio

tative nature, that is, think out all the possible questions about the problem and the desired solution which will involve qualitative answers. For instance, how good do our customers want the solution to be made? Do they want us to use the best materials, parts and units, or do they want us to use anything that will do the work satisfactorily? What are the conditions under which the solution will have to perform—are they difficult, ordinary, or easy? Describe them.

"The second group of questions will be quantitative, that is, questions pertaining to any information that can be expressed by number. Get the number. For instance, how much do they expect to pay? What is the load in pounds? What is the current in amperes? What are the revolutions per minute? etc. All these questions involve numbers. If they do not know the numbers, make them guess. By guessing they may be one hundred per cent wrong, but if we were to estimate them we might be five hundred per cent wrong.

"The third group of questions involve space, that is dimensions, locations and distributions in space, etc. Put all this information in inches and feet on your list.

"The fourth group of questions involve time. How long do they expect the solution to last? How often does it operate in a day, week, month, or year? Does it have to operate in the open, winter, or summer? What is the sequency of performance? Put this information down in seconds, minutes, and hours.

"The fifth group of questions will be of any other nature not included in the above four groups. We shall call them questions involving people as human consciousness, such as noise, appearance, comfort, safety, etc.; do not be afraid of duplicating questions. No harm is done if you duplicate some questions, but it will be unfortunate if you overlook some questions that might be of primary importance. If you simply remember the five letters Q.Q.S.T. and H., which stand for quality, quantity, space, time and human element, you will be able to get all the information which is to be gotten on the problem."

You can, perhaps, imagine the difference between the kind and amount of information obtained by White and Brown. White had to make a few more trips in order to get as much information as Brown got in one, but even then it was of inferior quality. Here and there figures were missing and yet, may I remind you, White was more able than Brown. This simply shows what can be accomplished with a little effort toward organizing yourself mentally. Thus we have seen how the QQSTH device can be applied to the work of obtaining information. Of course, its application is not limited to technical fields. Any kind of information may be collected with the assistance of this device. I hope I have shown you that even such an intangible thing as inventiveness could be clearly recognized and controlled for the purpose of producing better results in engineering. If you will try this QQSTH device in your work, I am sure, you will find it productive of great results.

Apparently, it is not clear to the man of industry that the greatest source of profit lies in the creative power of the employee. If this power is properly handled the results are more than gratifying; but, if it is mismanaged, the business could be wrecked over a short period of time.

No Crazy Ideas

In our development department, I made a rule that there were no such things as "crazy ideas." This encouraged the men to use their brains and to make suggestions. Of course, in many cases, the suggestions were crazy, but I would make a special effort not to make my opinion evident. I would consider such a suggestion seriously, and patiently, and I have found in many cases that the crazy suggestions turned out to be very good ones. I noticed that if his suggestion was laughed at the man who made it would close up like a clam. He would never try to make another one. In other words, his creative power would be paralyzed, and he would become of no use to the organization. I simply want to justify my statement that by mismanagement one can kill the creative activity of his employee.

It is true that in the past, the most important inventions came from the attic of a lone inventor. However, from that time the number of valuable ideas coming from the outside has been gradually decreasing and the number of ideas developed in the industrial organization has been gradually increasing. It is safe to say that from now on, by far the greatest portion of valuable ideas will be produced by the employees of industrial organizations. The time of the lone inventor is over. The industrial development department has taken his place.

There is one more thing I would like to tell in conclusion. An educated man is not necessarily a thinking man. In my experiece I have found more good thinkers in the shop than in the office. Therefore, do not neglect the shop and uneducated men in search for valuable ideas. An educated man has an advantage simply because he is better informed although he may not be able to use this information in a proper thinking process. The amount of available information is so great that no one can know it all. It is much better to know how to find the proper information at the time you need it, than to learn everything that comes your way and carry it in your memory.

The excessive amount of information in your mind is a definite hindrance to your inventiveness; somehow it acts as a dead load and prevents one from freely exercising his imagination. I am sure that any one of you has sufficient information and the necessary degree of inventiveness so that if you try to organize your thinking process you will be able to produce greatly improved results. I am sure you can do it.

Rockford, Illinois Next A.S.T.E. Chapter

"Probably the next A.S.T.E. Chapter will be at Rockford, Illinois," so states Ford R. Lamb, Executive-Secretary of The Society. "Already enough membership applications have been received by the Rockford Chapter Committee to enable them to be chartered by the National Society."

"However, Rockford Tool Engineers, feel that they can obtain more members and wish to defer their formal initiation and charter ceremonies until early this fall."

Roy Bramson, head of New Chapters Committee reports that New York City has already indicated that a chapter will be ready for installation there "early this fall."

Whichever of these cities is first to be chartered with a branch of the American Society of Tool Engineers, will round out the first even dozen chapters. Next chapter to be chartered will be No. 12.

Cincinnati, now organizing, may "nose out" both of the above cities to become Chapter No. 12.

A Tool Engineer's Impressions of Japan

(A synopsis of an informal talk presented before Cleveland Chapter A.S.T.E.)

By

Thomas Skove

Cleveland Twist Drill Company

Member A.S.T.E.

IT is not difficult for the American traveler to get along in Japan, for nearly everyone studies English in schools. Although the Japanese are unable to converse in English, they can readily comprehend written English.

Almost every foreign traveler in a business capacity has a connection of some type for his company, and his associate is usually an order taker who deals with the manufacturer and the wholesaler. Japan has a very unique system of selling and doing business. The manufacturer sells to a large wholesaler, who in turn sells to a smaller wholesaler, and so on down the line. It is very difficult to adjust complaints, and a very intricate and complicated system of credit is in use.

The Japanese Tool Engineer is quite different from the Tool Engineer in this country. He has a higher position or rating in industry, and rarely has he come up from the ranks as an apprentice. He is usually a university graduate who has learned his engineering mainly through theory. Although they have not had much practical training, they are eager to learn. It is very difficult for an American or European Tool Engineer to be of real assistance to the Japanese manufacturer because of their suspicious attitude and their fear that strangers might steal their secrets.

Their equipment is about fifteen years behind that of ours, but they are coming up rapidly. The manner in which the Japanese obtain their designs is—to buy an American-made machine, take it apart, and rebuild it again. When rebuilding the machine, they devote no attention to accuracy, but they are beginning to realize the necessity of accuracy in their machines.

The Japanese are very adept at copying any type of American-made product. As an illustration, Mr. Skove stated that pens similar in every respect, even to the white dot, to Shaeffer's lifetime pens were selling for $1.10 a dozen. They copy every style or type of tool, but they do not produce a quality product. The Japanese-made drill sells for 20% less than the American-made drill, but a Japanese-made drill lasts about one-sixth as long.

It is very interesting to note the rate of pay for the Japanese mechanics. The laborer works from 10 to 14 hours per day with a one-day holiday each month. Good mechanics make slightly over one dollar per day, which is equivalent to eight or ten cents an hour. Furthermore, their working conditions are bad, and many of the factories are not equipped with adequate accident-prevention equipment.

Europe Short on Natural Resources

SCARCITY of natural resources in a number of European countries has created problems of scientific research quite different from ours in America, at least, such was the conclusion of Willard F. Rockwell, Jr., of the Timken-Detroit Axle Company, of Detroit, Mich., who has just completed a six weeks tour of industrial research laboratories in England, France and Germany.

Mr. Rockwell returned recently on the liner Europa with a group of about thirty other American business executives, after having made an intensive tour of laboratories sponsored by the National Research Council's Division of Engineering and Industrial Research, 29 West 39th Street, New York City. Maurice Holland, director of the Division, was leader of the tour. Laboratories in nearly every major field of industry were visited.

"Scarcity of natural resources in the foreign countries is causing research to probe for new and synthetic materials," Mr. Rockwell said. "They are also confronted with such problems as stronger steels for armor plate, lighter and stronger alloys for aircraft, and more efficient and economical fuels.

"However, peace-time research is not being neglected. Cotton, rubber, leather, the building industries and many others are going ahead in the effort to make better products for domestic consumption at a lower cost.

"England has established government laboratories for similar lines of industry which are supported both by the government and private industry. This policy has not done away with private industrial research but has helped the small industries that are not able to maintain well-equipped laboratories, and the large corporations can send problems which they have not been able to solve themselves.

"A great many synthetic products have been developed and are already being produced in Germany. Others are awaiting economical methods of production.

"In the field of pure science Europe is maintaining her position of prominence through the National Physical Laboratories, Cavendish Laboratories, the College of France, Radium Institute, Pasteur Institute, the Kaiser Wilhelm Institutes, and many others. Such noted scientists as Lord Rutherford, Sir James Jeans, the Joliot-Curies, Jean Perrin, and Langevin are working for even greater discoveries than they have already made and are training young men and women to carry on their work."

PRODUCTION PERSPECTIVES

News of Mass Manufacturing from Everywhere

New England

Industries in Massachusetts have generally entered the third quarter of the year under strong momentum, with good operating schedules maintained and prospects good for the summer months. Two establishments were shut down for a time on account of strikes, **Van Norman Machine Tool** Company, Springfield, and the **Chicopee Manufacturing Corporation** of Chicopee Falls. Labor trouble elsewhere is held partially responsible for the slowing down of some lines of production.

Machinery and **electrical industries** are generally **running on a continued high level. Westinghouse** forces at East Springfield and Chicopee Falls **have been** only **slightly reduced. Machine tool concerns are busy** and little reduction has been reported at the **United American Bosch Company, Springfield,** which is now **entering upon an expansive radio production program** for the fall and winter. **General Electric Company,** Springfield, maintains its strong forward pace. **Gilbert & Barker** Manufacturing Company, West Springfield, with **a force of 1,700** employed, is well supplied with orders for gasoline pumps and oil burners.

Sporting goods industries are unusually active. A. G. **Spalding** & Bros., Chicopee are **operating their plants on a high level and J. Stevens Arms Company, Chicopee is operating at the highest rate in years** for the production of sporting rifles and shotguns.

The **small tool industry** in this section is generally **well supplied with orders.** Such establishments as **Greenfield Tap & Die, Greenfield,** and **Starrett** and **Union Twist Drill,** Athol are very active.

Jobbing firms working on jigs and dies and on small production items are **well occupied. Chapman Valve** Manufacturing Company, Springfield, **is maintaining its fast pace** in meeting demands. The **demand for small motors has been excellent** in recent months and this has helped to keep Westinghouse busy. **Perkins Machine & Gear Company** is **reported as producing in fairly good volume.** Very good production in dandy rolls is reported for B. F. Perkins & Son of Holyoke.

H. E. Dickerman Manufacturing Company of Springfield, Mass., **reports a good volume of business in jigs, dies, gauges and Diesel work.** With numerous installations of equipment in recent months and with facilities correspondingly improved, this concern is now handling twice the volume of business maintained in 1928 and 1929. **Indications for the coming months are considered good.**

The Van Norman Machine Tool Company has been the beneficiary of **a heavy demand for** American-made **machine tools from Russia.** The company's automotive division has benefited as well by increased foreign demand for its products.

Expansion programs hold the center of the stage in Worcester. G. F. Wright Steel & Wire Co. will spend approximately **$25,000 for a plant addition. Norton Co.** is engaged in **expanding at a cost of $125,000** while the **Heald Machine Co. is erecting an addition to cost $40,000.**

Henry F. Arnold, former superintendent of the **American Tool Co. died** July 10 at Hyde Park. He was with the concern 62 years, 43 of them as superintendent.

Management officials and Trade School authorities in Springfield, Mass., are well pleased with the success with which the cooperative plan is working out whereby a group of Trade School students alternate between their classrooms and the shops of seven industrial plants. The plan was inaugurated in February with six manufacturing plants and in recent weeks another plant, the Baldwin-Duckworth Chain Corporation was added to the list.

The Worcester Pressed Aluminum Co. of Worcester, Mass. **will soon move to its own plant on Hope Avenue,** purchased from the American Optical Co. **Cornelius A. Brosnan,** who founded the company is its administrative head.

Warren Cartwright, 53, **foreman of the machine shop** at the E. D. Jones & Sons Company, Pittsfield, Mass., **died suddenly** at his home. He had been in the employ of the Jones Company for 30 years.

S. F. Myers, manager of air-conditioning sales of the Westinghouse Electric and Manufacturing Company, East Springfield **reports a gain of 201 per cent in** the billing of Westinghouse **air-conditioning** for the first quarter of 1937 over the same period of 1936.

The Kent Manufacturing Co., manufacturer of small machine tools, **has purchased a factory at Winchendon.**

The saw department of **Russell Harrington Cutlery** Company, Turners Falls has **been moved to Southbridge,** according to Charles **W. Hazelton, superintendent.**

Allen McKinnon, 75, superintendent at the **J. W. Jolly Inc.,** Holyoke, for the past 31 years, **died July 15** at his home, after a long illness. He was a native of Sterling, Scotland, and came to this country 58 years ago. For the past 55 years he had been associated with the Jolly firm. He was **well known in the machinist and wheelwright industry throughout New England.**

Twenty-four metal working plants in Western Massachusetts reported 448 fewer workers employed in June than in the preceding month according to Allister R. Tulloch, secretary of the Springfield branch office of the Metal Trades Association. The June figure was 4,913 greater than June 1936.

Vacations with pay, the first ever granted by many manufacturers, coupled with continued labor disturbances in some areas and other factors such as inventory-taking, resulted in a slight recession during July in the Connecticut area. Many industrial centers saw post-1929 payroll records topple in June, and at least one, Bridgeport, exceeded its 1929 peak. Compilation of June payroll figures for the Connecticut city showed an average weekly disbursement of $1,244,386, highest since World War munitions-making times. In Waterbury, more than 25,000 factory workers enjoyed their first paid vacation July 3 to 11, with practically all major plants except that of Scovill Mfg. Co., closing down for the period. **The Scovill company** arranged to **stagger its employes' vacations** through the summer. Many other Connecticut manufacturers announced paid vacations, with a few, including Charles Parker Co., Meriden, giving a week's pay as bonus in lieu of vacation due to production needs. . .. **Fafnir Bearing Co.,** New Britain, and **Trumbull Electric Mfg. Co.,** Plainville, **gave bonuses of 12 and 5 per cent, respectively,** on employes' earnings of the previous three months. . . .

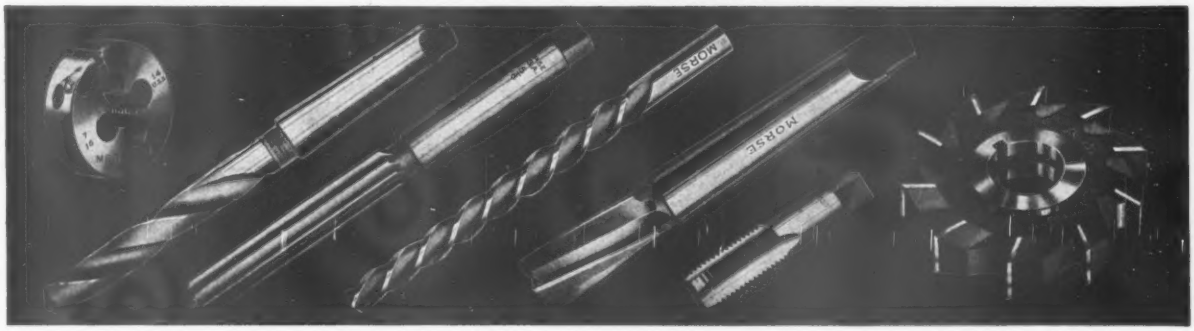
(Continued on page 48)

THERE IS A DIFFERENCE

In Meeting Your Needs

WHEN YOU CHOOSE FROM THE COMPLETE MORSE LINE

THE MORSE LINE INCLUDES HIGH SPEED AND CARBON DRILLS - REAMERS - CUTTERS - TAPS and DIES - SCREW PLATES - ARBORS - CHUCKS - COUNTERBORES - MANDRELS - TAPER PINS - SOCKETS - SLEEVES



No matter what your needs, your Morse distributor can meet them from the wide Morse line. And because every Morse Tool must pass high standards, it pays to rely for every tool on this name that is a byword in the shops of the world.

When you write "Morse" on the order form, you specify tools that are inspected at every step of their manufacture; — tools whose excellence is the result of years of tool-making experience.

No matter what your job, there is a Morse Tool of the proper size and type to do it.

★ *A Conveniently Located Morse Distributor Will Give You Prompt Service* ★

MORSE THERE IS A DIFFERENCE TWIST DRILL & MACHINE COMPANY NEW BEDFORD - - - MASS., U. S. A.

NEW YORK STORE - 130 LAFAYETTE ST. CHICAGO STORE - 570 WEST RANDOLPH STREET

A.S.T.E. CHAPTER NEWS

CLEVELAND

R. P. Oswell, Chapter Publicity Chairman, 1595 Hawthorne Road, Cleveland

NEXT CLEVELAND CHAPTER MEETING
Tuesday, September 14th, 1937
at The National Acme Company Plant
170 East 131st at Colt Road
Dinner in the cafeteria at 6 P.M
A trip through the plant, following the dinner and an address by Mr. A. E. Drissner, Vice-President and Chief Engineer
Notify C. V. Briner, Pratt and Whitney Co., 1433 E. 12th St., of your intention to attend.
Do it early.

DETROIT

R. M. Smith, Chapter Publicity Chairman
12775 Greenlawn Avenue, Detroit

Detroit members who attended meetings last year will remember meeting Messrs. Kubota, Otake, Hatamura and Hiroshina. These gentlemen are all connected with Nissan Jidosha Kaisha, Ltd., of Yokohama, Japan, where they manufacture a small car called the Datsun. Mr. Otake has been stationed at Graham-Paige Motor Car Company's plant for a year and is being relieved this month by Mr. T. Kamiye, Assistant Works Manager of the Nissan Plant in Yokohama. This shift will enable Mr. Otake to return to his family from whom he has been separated for approximately a year and members of the Society will have an opportunity to meet Mr. Kamiye during the coming months. Other visitors from the Orient are Mr. Yotaro Tsuge from Nissan Jidosha Kaisha, Ltd., and Messrs. Takesi Kato and M. Kachi of the Okajima Iron Works of Osaka, Japan.

DETROIT STUDENT CHAPTER

Jack Grant, Publicity Chairman
Detroit College of Applied Science

Detroit Student Chapter will hold a picnic Saturday, August 21 at 2:00 P.M. at 9 Mile Road and Inkster Road. There will be games, prizes, baseball. Tickets for admission are 25c. Senior and Junior members of the Society, as well as members' guests are welcome.

MILWAUKEE

Emmor E. Houston, Chapter Publicity Chairman
1029 So. 35th St., Milwaukee, Wis.

Brevity will be the keynote of Milwaukee Chapter news this month as most of our members are either taking vacations or planning them. Plans for the first Annual picnic to be held at Howard Avenue park on August 7th have held the spotlight of our activity for this month. The officers, together with the entertainment committee assure us that this picnic will be "tops."

George Smart, Chairman Milwaukee A.S.T.E. is motoring to St. Cloud, Minn., then on to Calumet, Mich., via northern Wisconsin, in August.

A trailer fan, Garvin Barr, Tool Supervisor Wisconsin Motor Corporation, is taking four months of relaxation in northern Canada. Some trip.

Our intrepid, big game hunter and explorer has been conducting a scientific expedition into the north, where he has investigated a species of "tri-motored" mosquitoes. We speak of none other than Irv Schober, Allis Chalmers.

Arnold Anderson will spend one week vacationing at Windlake.

Frank Burdick, Tool Engineer, formerly with Waukesha Reamer Co., is now with K. J. Papke Co.

Harold Heywood is to be congratulated for his article in the July Tool Engineer—a fine technical paper.

NOTICE

Milwaukee Chapter A.S.T.E. will hold a picnic on Saturday, August 7th at Howard Avenue Park, on Howard Avenue near Rapid Transit street car tracks. Come early and bring your families and friends. Members see officers for tickets.

PITTSBURGH

J. H. Thomas, Chapter Publicity Chairman, 7442 Pennfield Court, Pittsburgh

No meeting in Pittsburgh this month. BUT it is rumored that at least two members "attended" the meeting on July ninth. You know it's not a bad idea if you want a night out.

J. R. Weaver, Chairman, has been ill in his home at Irwin, Pa. He is now back at work. While convalescing he was allowed to help with household activities, phone, doorbell, etc. So as he assisted he became proficient in his duties, but alas, one late afternoon a knock came at the back door. He had scarcely opened the door when a "Knight" of the road spoke. "Mister, will you please give me a drink of water, I am so hungry I don't know where I am going to sleep tonight."

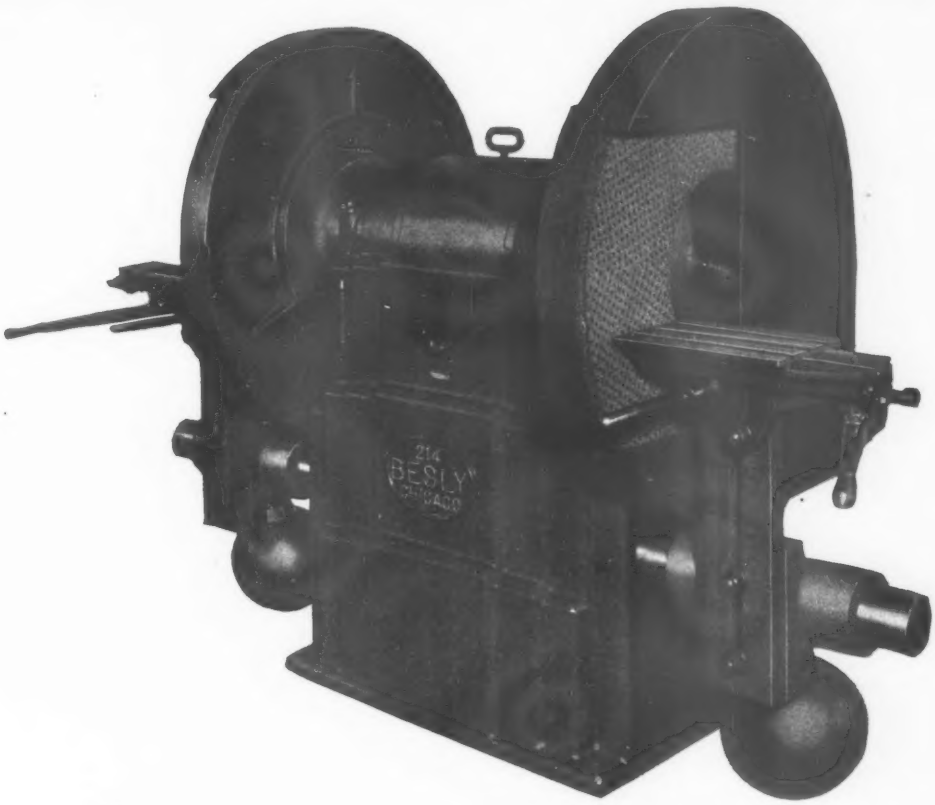
J. R. must have told D. L. Shelly, our secretary, who has just completed a new home in East McKeesport (Sunshine City), Pa. For when the Shelly homestead was opened for inspection, sure enough there was no back door.

About twenty members of Pittsburgh Chapter attended the West-

(Continued on page 39)

These Pittsburgh A.S.T.E.ers are officers of the Westinghouse Trades Apprentice Association. Seated: J. H. Sekerka, President. Left to right standing: H. Tuefen, Secretary; R. W. Mallick, Treasurer; J. H. Thomas, Vice-President.

Keeping pace with improvements in Abrasive Discs



Besly Titan Steelbac Abrasive Discs (Resinoid Bonded) with 1″, 2″ and 3″ of useable abrasive were introduced by us and have been adopted by most progressive manufacturers. ● Our next step was to bring out a line of Disc Grinders capable of carrying these improved heavy grinding members. Illustration shows a No. 214 Besly Grinder which is one of a series of machines developed to meet modern conditions. This machine has 40″ grinding members with oversize Geared Lever Feed Tables. The Rockershafts are larger than heretofore. The Wheel Collars backing up the Steel Disc Wheels are 22″ diameter. The spindle is almost 4″ diameter in the bearings. Heavy Welded Steel Hoods protect operator, while the sturdy, well proportioned base helps absorb the vibration always present in a grinding machine.

This type of Besly Grinder is built in various sizes to carry 15″ to 40″ diameter grinding members, all with Multiple Vee Belt Drive employing standard motor mounted at rear of base. If you are thinking of replacing your old Disc Grinder, be sure and get details concerning these newly designed Besly Grinders.

Write for your copy of Booklet on Besly Titan Steelbacs.

CHARLES H. BESLY AND COMPANY

118-124 NORTH CLINTON STREET ★ CHICAGO, ILLINOIS

NEW *Equipment*

Odin Universal Clamping Device. A tool of interest to manufacturing executives for production, as well as for tool room use. This device can be attached to any milling machine, planer, shaper and drill press without resetting the work. It is claimed that this device solves many manufacturing problems as it can be rotated to any angle or degree without removing or disturbing the piece to be clamped and can be transferred from one machine to another without resetting the work. These units can be used in part or fully assembled. It is claimed that these machines are fully universal and that their construction is such that complete rigidity and accuracy is insured. This equipment is manufactured by the Odin Universal Corporation, 110 South Dearborn Street, Chicago.

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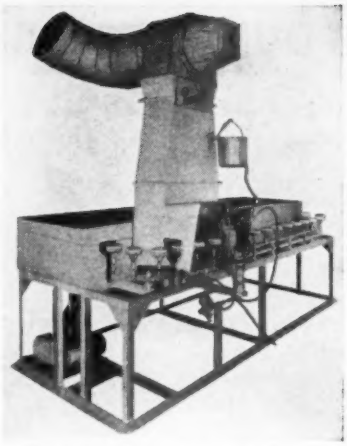
Paasche Air Brush Company, Chicago, Illinois, have recently built an automatic unit designed for coating both round cases and rectangular bases for alarm clocks. The unit consists of a conveyor equipped with steel roller chain to which are mounted a series of revolving spindles. The pieces to be coated are supported by removable carrying fixtures and as each part enters the coating stage the Paasche Automatic Air Brushes turn off and on automatically. The pieces next pass into a drying compartment, or oven, insulated with rock wool and equipped with electric strip heaters. Temperatures up to 180°F are maintained by means of a thermostatic control. It is claimed that in this instance the unit is 250% faster with more uniform finishes assured than with manual methods. The pieces are coated and dried in a single handling, thus preventing fingerprints or blemishes on the freshly lacquered surface, reducing rejects to a minimum.



Paasche Automatic unit for coating parts on production scale.

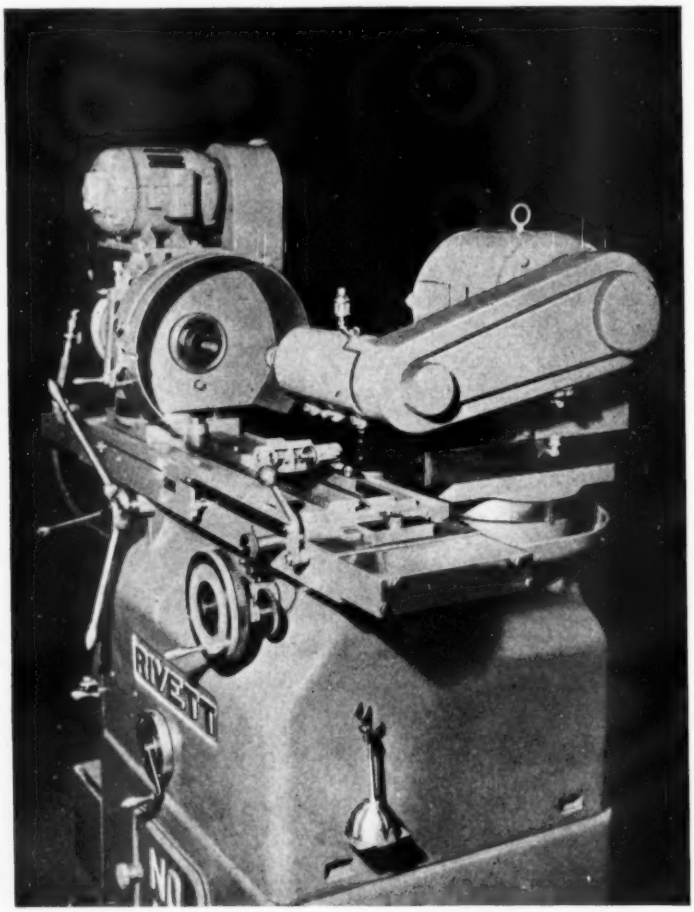
▼ ▼ ▼

Rivett Lathe & Grinder, Inc., Brighton, Boston, Massachusetts. This company has recently added to their line of precision internal grinders, the new Rivett 112, as illustrated on this page. The new machine is primarily built for medium and large tool room work, straight, bevel, two angle or straight and beveled grinding at one setting. With low speed spindle carrying a wheel up to six inches diameter by one half inch face, it may also be used for external work. The extreme simplicity of its design, it is said, makes it specially effective on a wide variety of parts and practical for any mechanic to operate. The machine offers a great range, easy access for set-ups and adjustments and trouble proof construction, it is claimed. Many leading manufacturers, it is claimed, employ this machine in preference to other grinders for experimental and development work.

The workhead and work reciprocate with the table while the grinding wheel remains stationary. This arrangement gives vibrationless support to the grinding spindle and permits the speeds necessary for small hole work. The workhead is mounted on a shoe and scraped to the upper table and clamped in any position by two T-bolts in a T-slot. The base of the workhead is graduated to swivel 90° each side of center so that the head can be set for taper grinding steeper than can be obtained by the 5° swivel of the table. An individual motor drive provides three selective spindle speeds. The spindle mouth is ground to take Rivett 6 N.S., 1" collet capacity collets and step chucks operated by screw draw-in spindle or lever chuck closer. Jaw chucks, face plates, and other fixtures may be mounted on the threaded spindle nose.

All moving parts are fully enclosed and all drive bearings, reciprocating mechanism and table ways are automatically lubricated by the

(Continued on Page 24)



ENGINEERED PRODUCTION
EXAMPLES FROM THE SUNDSTRAND FILES
No. 3722
Lathes
Milling Machines
Tool Grinders
Centering Machines
Balancing Tools

Fast, Automatic Cycle of Model 10 Lathe

Speeds Production, Reduces Cost of Camshafts

The fast, accurate automatic operating cycle and simple, convenient control of the Model 10 Stub Lathe shown in Fig. 1 reduces cost and speeds up production of camshafts shown in Fig. 2. The application of center drive permits turning both ends of the shaft simultaneously, reduces work-handling, insures accurate relation of turned surfaces and eliminates springing of shafts between centers.

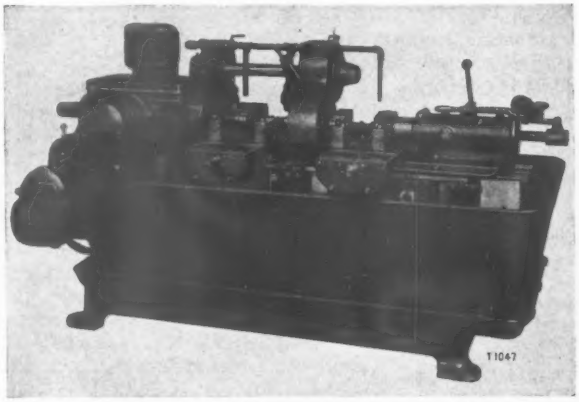


Fig. 1 Model 10 Automatic Stub Lathe equipped with center drive for turning automobile camshafts.

Operations, shown in Fig. 3, are turning bearing and gear diameters, grooving and chamfering. Material is tough forged steel; finish is smooth, accuracy well within required limits. Operator loads machine, clamps work-piece, starts automatic cycle. Tools rapid traverse to work, feed to depth, turn, stop, automatically reverse and return to starting position. Automatic tool relief protects finished surfaces during return of tools. Spindle and coolant stop automatically at end of cycle thus facilitating work-handling.

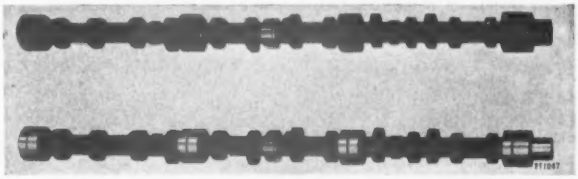


Fig. 2 Forged steel camshafts before (above) and after turning.

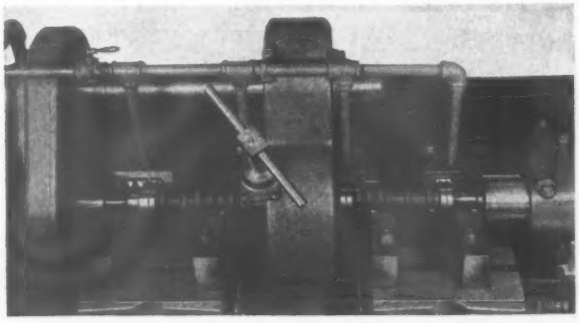


Fig. 3 Close-up of center drive and tooling for turning, grooving and chamfering operations on camshafts.

Sundstrand Model 10 Stub Lathes are unexcelled for high-production turning on all short- and long-run work within their capacity. They are simple to set up and change from job to job, have ample power to operate multiple tooling efficiently, strength and rigidity to maintain close limits and fine finish. Automatic cycles, including feeds and spindle speeds can be established quickly by changing pick-off gears and setting trip-dogs, no special cams or other parts are required. Complete information on features and advantages of these machines is contained in Bulletin 10SL. Write for a copy today.

SUNDSTRAND MACHINE TOOL CO.
2532 Eleventh Street, ROCKFORD, ILLINOIS, U. S. A.

RIGIDMILS - STUB LATHES
Tool Grinders - Drilling and Centering Machines
Hydraulic Operating Equipment - Special Machinery

New Equipment

(Continued from page 22)

Blanchard Pulsolator System which consists of a central pumping unit and individually adjusted pressure feeders for each bearing.

▼ ▼ ▼

A further development in their application of Air Control to tapping operations is announced by R. G. Haskins Company, Chicago.

The initial development made use of a device known as the Haskins Air Cylinder, to operate the foot pedal of their high speed tapper by means of compressed air. The tap head moves up and down, the piece to be tapped being held stationary on the work table.

To still further increase the sensitivity of Air Controlled tapping, the Haskins Air Jig has been designed. In this case the tap head is held in a fixed position and the blanks are presented to the tap. An air operated piston moves the air jig table vertically, the movement being governed by a foot pedal control valve assembly. This latter unit consists of a foot pedal and base, plunger valve, pressure regulator, and pressure gauge.

The new unit does away with the operator having to gauge the pressure which is applied to the tap. It not only maintains uniform pressure throughout the stroke but it controls the speed of feeding and reversing the tap. The pneumatic control can be accurately regulated to meet exactly the requirements for each tapping job. For certain classes of work where the pieces are not too heavy or bulky, this development, it is claimed, affords new accuracy in high speed tapping and considerably longer tap life.

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The Torrington Manufacturing Company, of Torrington, Connecticut, which has specialized in the design and building of special machinery for the manufacturer of strip, sheet, tube, rod, wire and cable for mills of the ferrous and non-ferrous industries, announces its entry into the field of Spring Making Machinery. A corps of engineers, experienced in the design of spring making machinery, has been engaged for the past year in the development of new, improved and modern high speed production equipment. A few of the features of the new designs are: Simple feed adjustment, safety hand wheel, fully enclosed compact design and built-in motor; ample wire and coil capacities in each machine; Timken Roller Bearing equipped; convenient accessible controls for pitch diameter, cut off etc.; square clean cut ends; production speed variable either by change gears or standard variable speed unit; wire feed on clutch type adjustable through fixed center change gears or sliding gear box. The line includes segment and clutch type coilers in 8 sizes covering a range from .006" to ⅜" diameter wire and Torsion Spring Machines in 4 sizes covering a range from .006" to ¼" diameter wire. The Company is also prepared to supply all necessary tooling for any requirements within the range of these machines and attachments for long coils, square or odd shaped wire coiling rings, etc.

▼ ▼ ▼

Brown & Sharpe No. 5 Plain Grinding Machines.—3"x12" and 3"x18". The No. 5 Plain Grinding Machine recently announced by the Brown & Sharpe Mfg. Co., of Providence, R.I., is a new, small-size machine de-

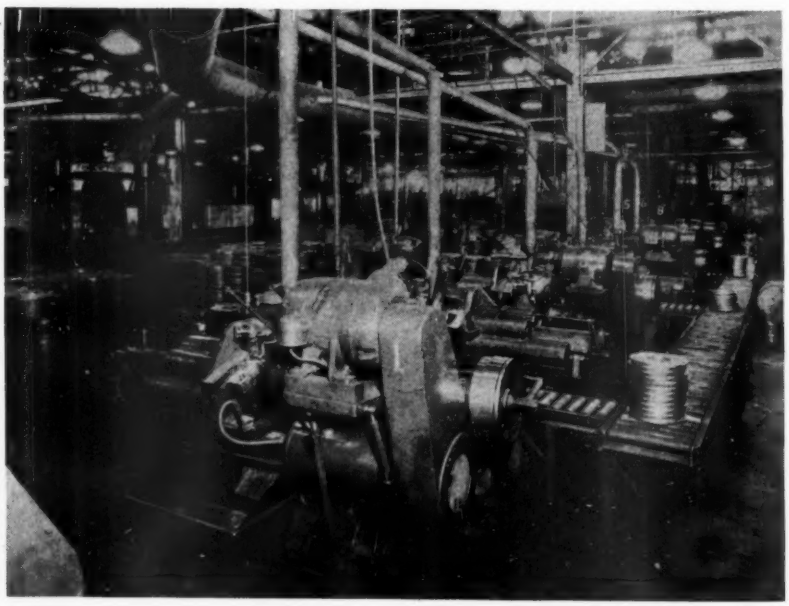
The newly announced Brown & Sharpe No. 5 Plain Grinding Machine.

veloped particularly for the rapid cylindrical grinding of duplicate small parts to close limits on a production basis. It is available in two capacities, 3"x12" and 3"x18", the shorter-table machine being recommended for installations where the work is not over 12" in length and minimum floor space is an important factor.

All operating controls and adjustments are grouped at the front of the machine, right at hand from the operating position. The recessed design of the base provides ample legroom for the operator to sit comfortably at the machine; while the convenient height of the table and controls provides for equally efficient operation from a standing position.

The headstock and coolant pump are started and stopped electrically by rotation of the cross feed handwheel, starting automatically when the grinding wheel is advanced toward the work and stopping when the wheel is withdrawn to unloading position. This feature, in combination with the headstock brake, aids materially in maintaining high production schedules. A lever permits cutting out the headstock and coolant pump motors when wheel-truing or setting-up. An additional aid to rapid production consists of the table

(Continued on page 26)



In this shop eight Gisholt Simplimatics do the work formerly requiring twenty-four machines of the old type.

See that Flat!

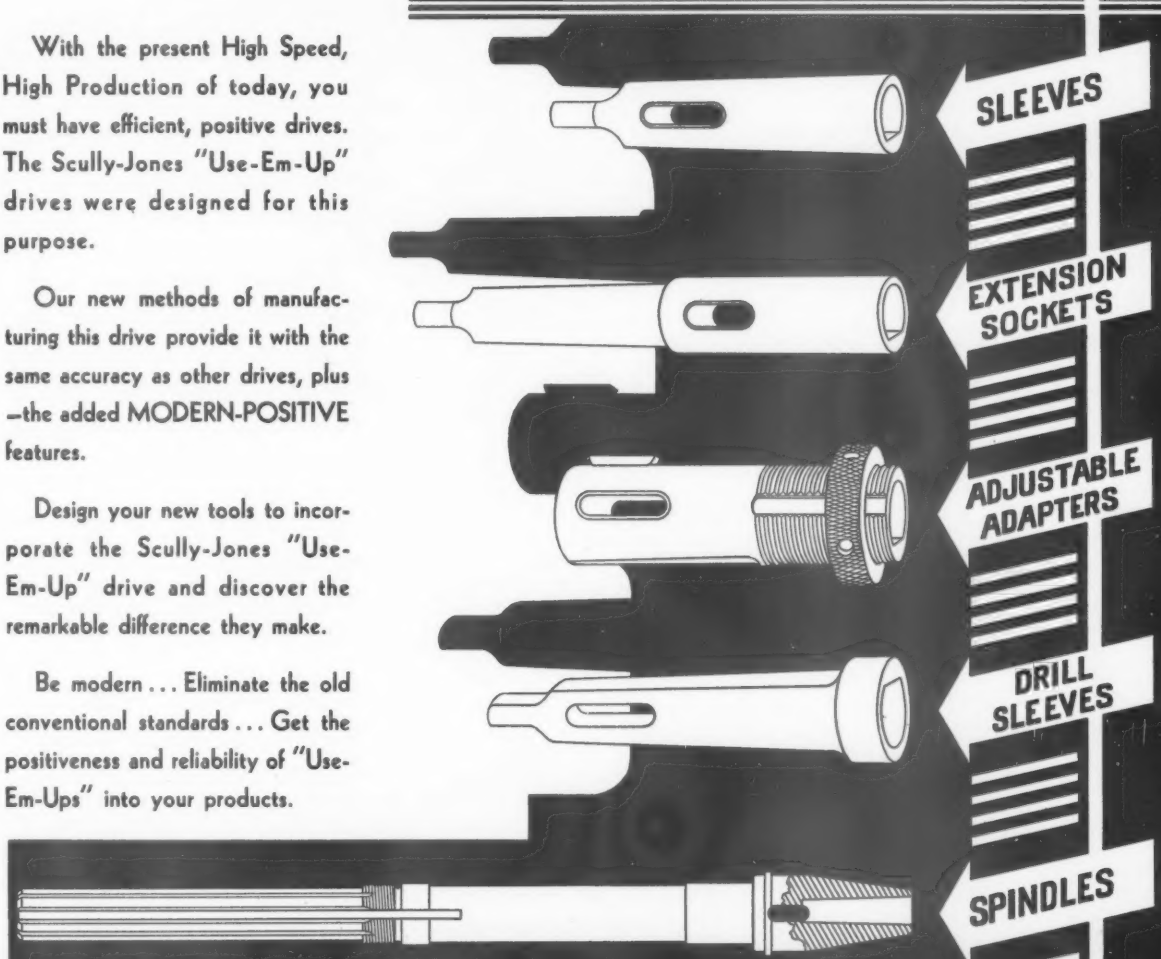
DRIVES THAT ARE *Positive*

With the present High Speed, High Production of today, you must have efficient, positive drives. The Scully-Jones "Use-Em-Up" drives were designed for this purpose.

Our new methods of manufacturing this drive provide it with the same accuracy as other drives, plus —the added MODERN-POSITIVE features.

Design your new tools to incorporate the Scully-Jones "Use-Em-Up" drive and discover the remarkable difference they make.

Be modern . . . Eliminate the old conventional standards . . . Get the positiveness and reliability of "Use-Em-Ups" into your products.



For detailed information and prices, ask for Standard Tool Catalog Number 105 . . . For suggestions and examples of their application to Special Tools, request Catalog Number 200

SCULLY-JONES & CO.
19th AND ROCKWELL STS.
CHICAGO, ILLINOIS

Scully-Jones "Use-Em-Up" Drives

MANUFACTURERS OF QUALITY PRODUCTION TOOLS

New Equipment

(Continued from Page 24)

tray—a handy place to put work pieces, dogs and tools.

Wheel spindle, headstock, table and coolant pump are driven by separate motors, a push button station at the front controlling the starting and stopping of the entire machine. All electrical control units are built into the machine, and are well protected, yet easily accessible. An automatic oiling system lubricates the wheel spindle bearings, the cross feed screw and full nut, the table and cross slide ways and the table driving mechanism of the machine. The coolant tank is integral with the bed casting, and has removable cover and baffle plates. The centrifugal motorpump is also removable, to facilitate cleaning of the coolant tank.

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Gisholt Radial Type Simplimatic by the Gisholt Machine Company, Madison, Wisconsin. A striking example of the efficiency of this machine is indicated in the fly wheel department of a large automotive manufacturer. Eight new Gisholt Radial Type Simplimatics now produce as much as twenty-four machines of the old type, thus saving 2/3 of the floor space formerly used. More than 1,000 fly wheels are produced in 7½ hours by the new Gisholt machines which make possible combining in one operation on one machine, what formerly required three operations on three machines. The tools of these machines are arranged radially to the work to permit the maximum number of cutting tools to operate simultaneously. The machines are equipped with a special heavy carriage having a vertical face on which sturdy tool-slides are mounted close to the work piece with a minimum overhang of the tools. The tool-slides are thus brought close to the work and can be applied without excessive overhang or interference. Cam segments, mounted on a single drum, control the movement of the tool-slide. The segments can be changed, if necessary, to provide different timing of the slides for other work and different feeds.

The machining cycle is entirely automatic, it being necessary for the operator to move only one lever. The master carriage slide on which the tool-slides are mounted is traversed close to the work by air pressure. The spindle then starts to rotate and the cam-drum feeds the tools to the required dimensions. Upon the completion of the turning operations, the tool-slides are returned to their starting positions on the master slide, after which the master carriage slide is quickly traversed back to its starting position, and the spindle is stopped. The machine is then ready for reloading.

The cutting tools used on these machines remove approximately 3/32 inch of stock. The cutting speed is approximately 200 feet a minute, except for the final shaving operation, which is performed at a speed of 100 feet a minute. A feed of about 0.030 inch per revolution has resulted in a long tool life between grinds.

On each machine, the fly wheels are held in a three-jaw air-operated chuck. They are located on three pins in the chuck face and clamped around the circumference.

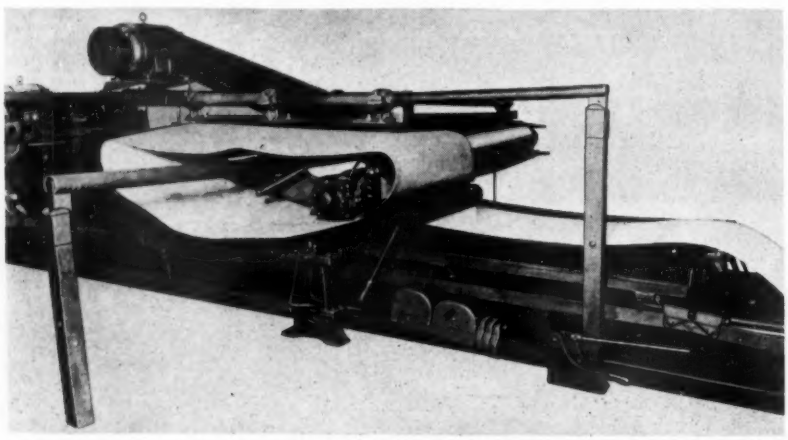
Excelsior Tool & Machine Co., East St. Louis, Illinois, announces the No. 27-H Excelsior Automatic Stainless Steel Sheet Grinding and Polishing Machine. For commercial production plants who desire to polish sheets for their own products. The machine is adaptable for polishing and finishing sheet metal for stove tops, electric iron face castings, automobile bumpers and various other sheet metal parts.

Stainless steel, owing to its nontarnishing and rust resisting qualities has been finding an ever increasing use in mass production plants. Heretofore considerable rough grinding was required to remove pits and rolling defects. However, rolling methods are now so improved that the quality of such sheets makes it practical to use simplified grinding methods and thus reduce finishing costs. The Excelsior No. 27-H Machine, illustrated, is built to use commercial abrasive paper in any width specified for 12 and 16 foot endless belts which are now obtainable at less cost from manufacturers than was possible to re-surface belts the old way, and the assembly is sufficiently heavy for continued production to withstand the power applied to the belt without setting up vibration.

The polishing head consists of 2 steel diametrically balanced pulleys with shaft supported on both sides in dust proof ball bearings, mounted in 2 cast steel machined housings, a centrally located flexible rubber covered pressure roll which applies the pressure to the grinding belt by gravity, any desired amount of pressure can be applied, uniformly distributed over the entire width and length of the sheet.

The carriage or table is mechanically operated and adjustable to any length sheet which is passed back and forth under the grinding belt the required number of passes. The grinding head is then raised, the carriage stopped at the extreme forward travel and the finished sheet removed.

There are no other electrical, compressed air or hydraulic appliances used to operate the machine or guide the grinding belt on the pulleys, as the belt remains central after the first adjustment is made. A 3 H.P. Motor is used to operate the carriage and a 40 H.P., 1800 R.P.M. Motor with V Belt operates the grinding belt. Two men are required to handle the sheets and operate the machine.



Showing the Excelsior sheet grinding and polishing machine, with grinding belt partly removed.

▼ ▼ ▼

Buhr Machine Tool Company, Ann Arbor, Michigan, announces, three lines of quicklock adjustable holders for drills, reamers, taps and spot facers which are now being manufactured with design improvements for greater strength and accuracy.

The construction of these Buhr

(Continued on page 43)

• USE LANDIS GRINDERS •

GRINDING... TRANSMISSION .....PARTS

LANDIS 6" and 10" Type C Plain Hydraulic Grinders are being extensively used for the grinding of automobile transmission parts.

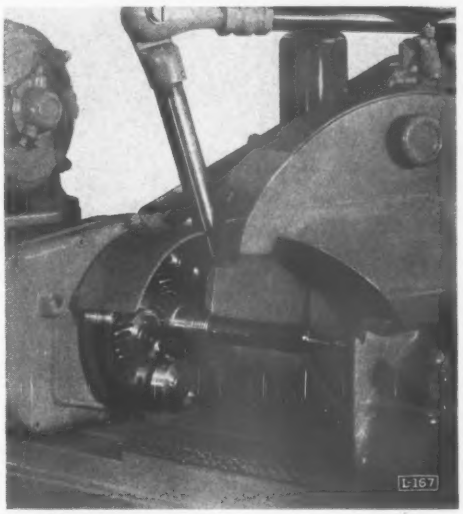
The reasons for this are not difficult to find. Type C equipment is productive. It will produce consistently accurate work within close limits. Operators like its convenience. And Landis has the experience and the facilities which assure the best in tooling for each job.

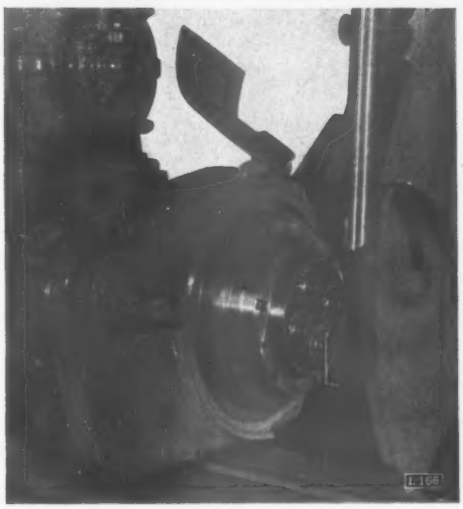
Take the three set-ups illustrated. The upper one shows the grinding of a spline shaft bearing. Because this bearing has two diameters a profile wheel truing device is used to true the wheel. Grinding is by the straight infeed method.

The center set-up shows how the bearing and adjoining shoulder of a clutch connection are ground. The wheel base is set at an angle, the wheel face is formed with a right angle truing device and the wheel is fed straight in. A gear chuck holds the work.

Below, the outside diameter of a synchronizing ring is being ground. Again the wheel is fed straight in and the work is held by a gear chuck. A reciprocating wheel spindle mechanism completes the equipment.

Many other transmission parts are being ground on Landis Type C equipment. The users are all highly satisfied and so we, with confidence, recommend Landis Grinders for your transmission parts. #233





LANDIS TOOL COMPANY
WAYNESBORO, PA.

Milling Three Lugs Simultaneously On Clutch Pressure Plates

AN interesting operation of straddle milling the faces of three lugs on clutch pressure plates is found in the Borg and Beck plant of the Borg-Warner Corp., Chicago, Ill. The equipment for this operation consists of a Cincinnati No. 3-36 Hydromatic Milling Machine, having three spindles and equipped with an air operated chuck at each end of the table. This milling operation is unusual in the high production and compact design of machine required by the purchaser of the equipment, and the precision tolerances which must be maintained.

The machine is located in a production line handling two sizes of clutch plates. Interchangeable jaws take care of the two sizes. This line in the Borg and Beck plant is composed of very efficient equipment for completely machining the pressure plates, as well as assembling and balancing.

The Cincinnati Hydromatic for milling the clutch plate lugs is built up from a standard machine. The conventional right hand headstock is replaced by a flat top headstock, 62" high. One of the spindles is contained in the conventional right hand spindle carrier, which is bolted in a fixed position to the face of the headstock. A second spindle is mounted in an angular housing supported in the regular overarm dovetail bearing slide on top of the right hand carrier. This angular spindle, at the top of the machine, is driven by a separate gear motor. A third spindle is mounted in a housing fixed to the front face of the machine bed, and driven by a special connection to the machine driving unit. The machine is equipped with a variable feed attachment and cam, for automatically varying the feed rate as the width of cut increases, thereby obtaining the greatest possible cutting efficiency.

Two positive table stops are provided to prevent the cutters from contacting the face of the clutch plates. If at any time this job is discontinued or the design is changed, the two special angular spindle carriers can be removed and the machine converted into a standard Hydromatic Milling Machine for other work.

There are two special fixtures, one mounted at each end of the machine table. Each fixture holds one part, and with the aid of adapters, two sizes of parts may be milled. The plunge-cut method of milling is employed. The work-piece is located from the previously finished outside diameter by six equalizing clamps, the contact faces of which are serrated changeable adapters. The finished back face of the work-piece rests against three fixed supports. Angular location is fixed by an arm which contacts two lugs, having a spring arrangement to clear it from the work when milling. These fixtures are operated by air. The operator loads and unloads the work in one fixture while the work-piece in the other fixture is being milled. The cutters are approximately 7" diameter half side mills, running at a cutting speed of 80 feet a minute. Production is very rapid; at a rate of .24 minutes per piece.

The Cincinnati Milling Machine and equipment described in this article is one of the important factors which made possible the remarkable production of 1,500,000 Borg and Beck clutches during 1936.

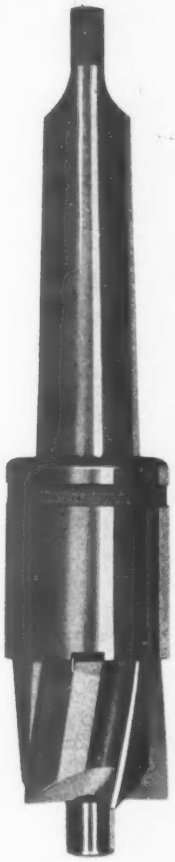
—H. J. Dods, The Cincinnati Milling Machine Co.

MORSE

CORE DRILLS

COUNTERSINKS

COUNTERBORES

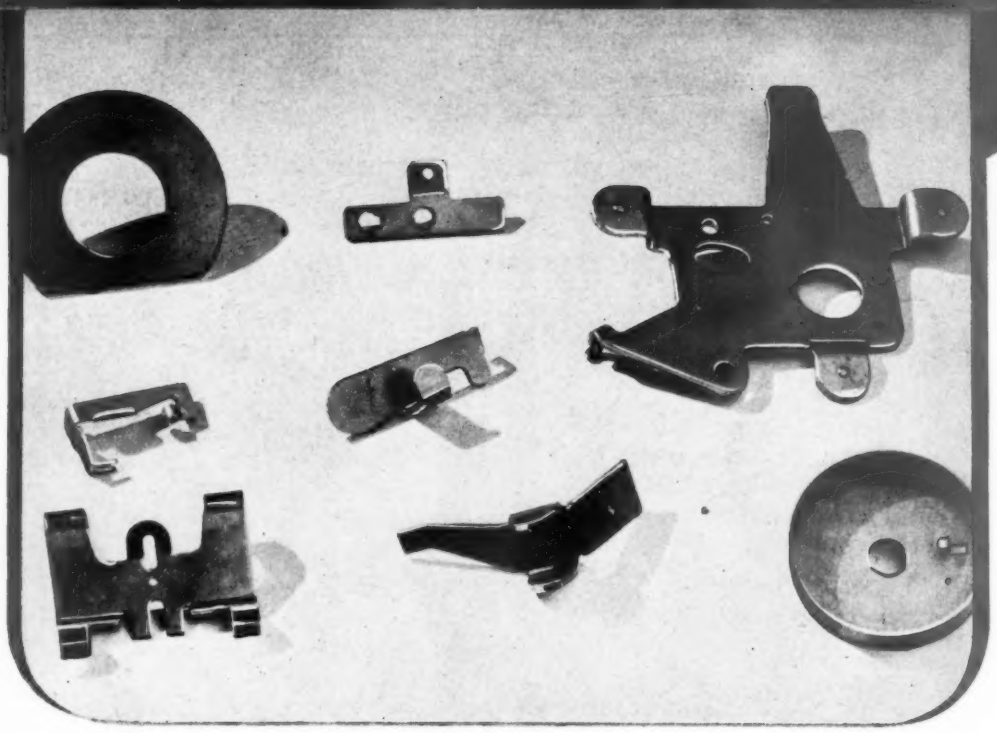


The extreme ruggedness of the patented Morse drive is an important factor in the tooling of heavy roughing cuts on countersinking, counterboring and coredrilling operations. We are in a position to render expert engineering and designing service on your tooling problems. Consult us.

MORSE TOOL CO.

116 E. GOLDEN GATE AVE. **DETROIT, MICH.**

Here are typical metal stampings supplied **IBM** in small lots . . .



by DAYTON ROGERS

Hundreds of different types of experimental stampings in small lots are supplied to International Business Machines Corporation on short notice by us for their development and engineering departments.

As specialists devoted to the exclusive production of metal stamped blanks in small lots, our organization serves I.B.M. quickly, accurately and economically, saving time and expense which ordinarily might be prohibitive for dies used on small lot requirements.

Many other leading manufacturers avail themselves of Dayton Rogers service made possible through a new and improved method developed by us for assuring exact duplication of all blanks and pierced holes and slots. We are prepared to offer definite savings on stampings of any shape, blanked, pierced and formed from any material and to the exact specifications required.

Send us your blueprint or sample for an estimate. You, too, will be convinced that Dayton Rogers service will save you money.

A valuable stamping service for

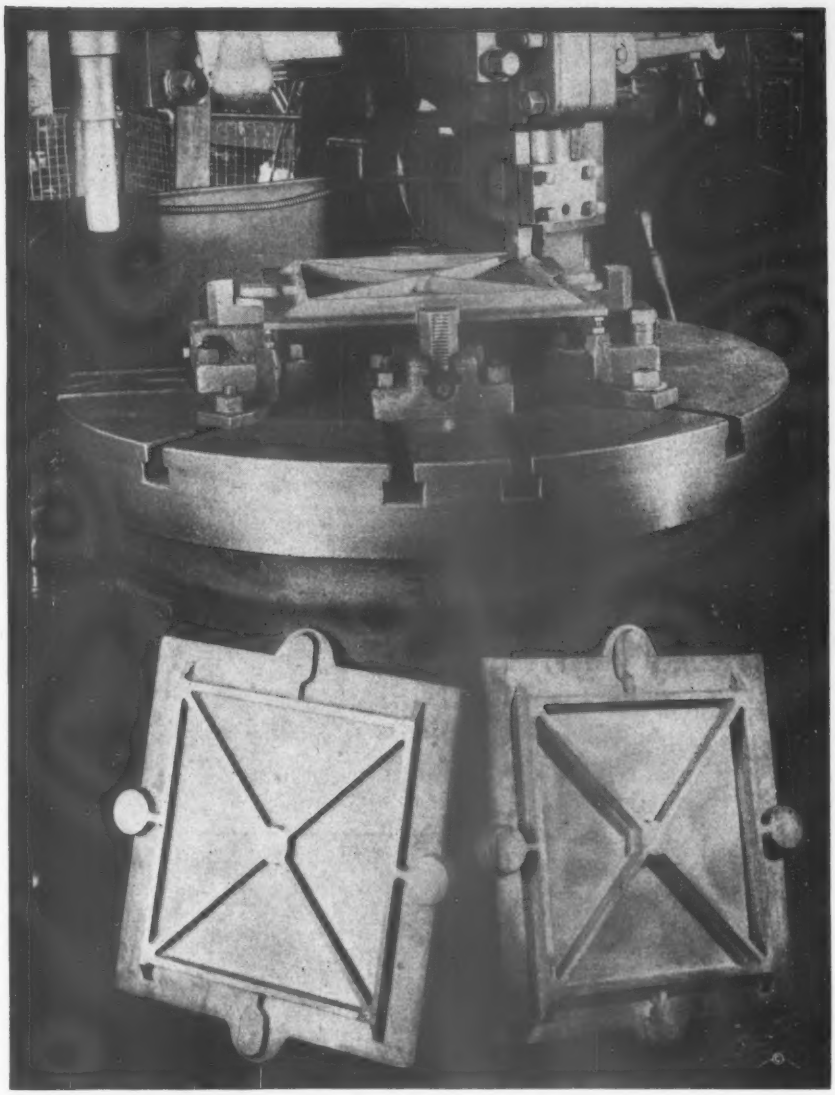
—experimental work
—the development of new products.
—the manufacture of devices having only a limited market
—the improvement of existing products.
—meeting competitive market conditions
—meeting time limitations
—meeting production cost limitations

A complete stock of stamping materials is maintained for immediate use, including: Sheet steel, strip steel, sheet brass, sheet aluminum, dural, copper, bakelite, sheet bronze, nickel silver and aeroplane alloys.

Send for Bulletin giving actual costs on specific jobs.

DAYTON ROGERS MANUFACTURING CO.
MINNEAPOLIS MINNESOTA

Vascoloy-Ramet is available in three forms: (a) completely finished tools, (b) milled and brazed tools, and (c) blanks. V-R blanks are furnished in 5 standard styles and in sizes to meet every requirement. To make tools with V-R blanks is a simple operation, fully described in a new instruction booklet, sent free—upon request.



Intermittent cutting, core plate 18"x 20", ribbed on one side, flat on the other. Material: Cast iron. Tool used: V-R, grade A, 1¼" square; style 6, ground 6° clearance, flat top; 1/16" radius on nose. Two core plates are shown in the lower foreground, at the right—un-machined; at the left—finish machined.

Tool Used	Feed	Depth	R.P.M.	Speed	Pieces per Grind
Vascoloy-Ramet Grade A	.025"	1/16" to 1/8"	60	180 FPM Maximum	25 (Both sides)

Cast iron and cast iron alloys, semi-steel, brass, bronze, aluminum and aluminum alloys, non-ferrous metals and materials, all steels from the softest to the hardest and toughest alloys—whatever the material there's a V-R grade which precisely fits the job.

Produced in 17 standard grades, of different tantalum-carbide content, strength and hardness, it alone covers the entire range of machinable materials with "a grade for every use."

That is why Vascoloy-Ramet is setting new records daily for increased pieces per grind, for faster time from floor to floor, for lowered production costs.

This is the reason for its rapidly increasing acceptance as the preferred tool material, in great industrial plants and in small shops, as well, throughout the country.

The new V-R catalog price-list will be sent upon request.

VANADIUM-ALLOYS STEEL CO.
Vascoloy-Ramet Division, North Chicago, Ill.

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VASCOLOY-RAMET

. . . The TANTALUM CARBIDE TOOL MATERIAL . . .

A GRADE FOR EVERY USE

HANDY ANDY'S ..WORKSHOP..

THE Workshop has produced at least one unofficial institution—the Hall of A.S.T.E. Fame—intended to further that good fellowship for which the Society is known, also, to give a bit of recognition to members whose work has been outstanding. But now, as the Society grows and new Chapters are admitted throughout the land (and elsewhere) it becomes a job for a Solomon to select outstanding men North East West South. I'm no Solomon, and have long since come to realize that this man's outfit already includes so many outstanding men that it would take a head janitor and assistants just to keep the chrome plated laurels polished. There is no appropriation for such a staff, hence, new entrants to the Hall will have to be selected by the boys from now on.

▼ ▼ ▼

Before surrendering my job as head keeper, however, there are several men deserving of tribute, and if these are chosen from Detroit it is because they have been with the Society from the beginning, or nearly so. They have helped to make it what it is. First on the list is Al Sargent, erstwhile Secretary and a lot of other things not designated by title. Al was a friend in need when the embryo A.S.T.E. needed friends, has been and remains a pinch hitter who wields a heavy bat on occasion. He has given freely of his time, has furnished us a headquarters, has been a force in promoting the A.S.T.E. Standards, giving the services of his clerical and engineering staffs in preparing Standards forms. We'll drink to him.

▼ ▼ ▼

Next on the list is R. M. (Bob) Lippard, with plenty of Tool Engineering background albeit I've always insisted he should have been a lawyer. And Homer Bayliss, a scholar and a gentleman who has served the Society well and capably if rather too modestly. A power behind the throne, as the saying goes. Then there is Frank Crone, burning the midnight juice keeping our accounts straight, a Herculean task considering the way the Society grows. Another is Ray Brunner, who just smiles his way through the mess of details falling to the lot of a Secretary. Good fellows all, so give 'em a big hand.

▼ ▼ ▼

There are many others, especially live wires in the newer Chapters who are being heard from. They're all in the family. And now, in a niche by himself, the unknown A.S.T.E.er who is not among the Big Shots, who doesn't crash the headlines or the Hall of A.S.T.E. Fame, but who nevertheless carries the Society along by supporting it, by attending meetings and paying dues, by sticking to it. To the Average Tool Engineer, and may his shadow never grow less. Skoal!

▼ ▼ ▼

I happened to be guest speaker at Detroit Student Chapter's meeting recently, held at D.C.A.S., of which more later. What I talked about doesn't matter so much; I was just there and spoke my piece. The important thing is the participation of these junior men and women (oh yes, we have a lady Tool Engineer too) in the affairs of the Society,

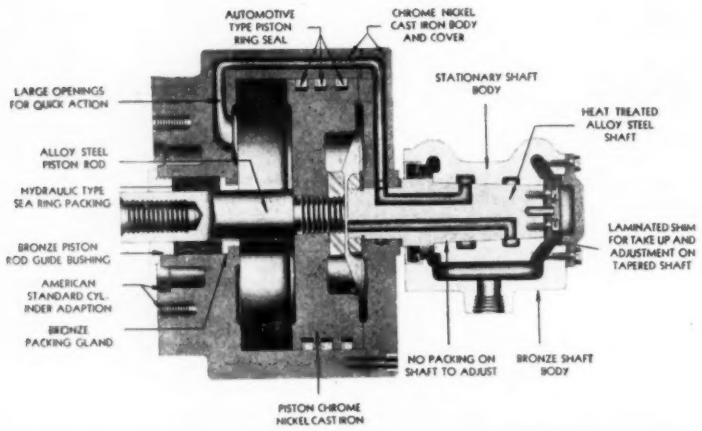
(Continued on page 34)

Check These Outstanding Features "LOGAN"

ROTATING HYDRAULIC CYLINDERS

CHECK! the many outstanding design features of "LOGAN" hydraulic, double acting, rotating type cylinders. Note the complete elimination of all packings except the self-adjusting sea ring packings in the piston rod stuffing box.

These many outstanding features assure continuous service without maintenance expense. Write for Section 2, Catalog 80 for complete information.


AUTOMOTIVE TYPE PISTON RING SEAL
CHROME NICKEL CAST IRON BODY AND COVER
LARGE OPENINGS FOR QUICK ACTION
STATIONARY SHAFT BODY
HEAT TREATED ALLOY STEEL SHAFT
ALLOY STEEL PISTON ROD
HYDRAULIC TYPE SEA RING PACKING
LAMINATED SHIM FOR TAKE UP AND ADJUSTMENT ON TAPERED SHAFT
BRONZE PISTON ROD GUIDE BUSHING
AMERICAN STANDARD CYLINDER ADAPTION
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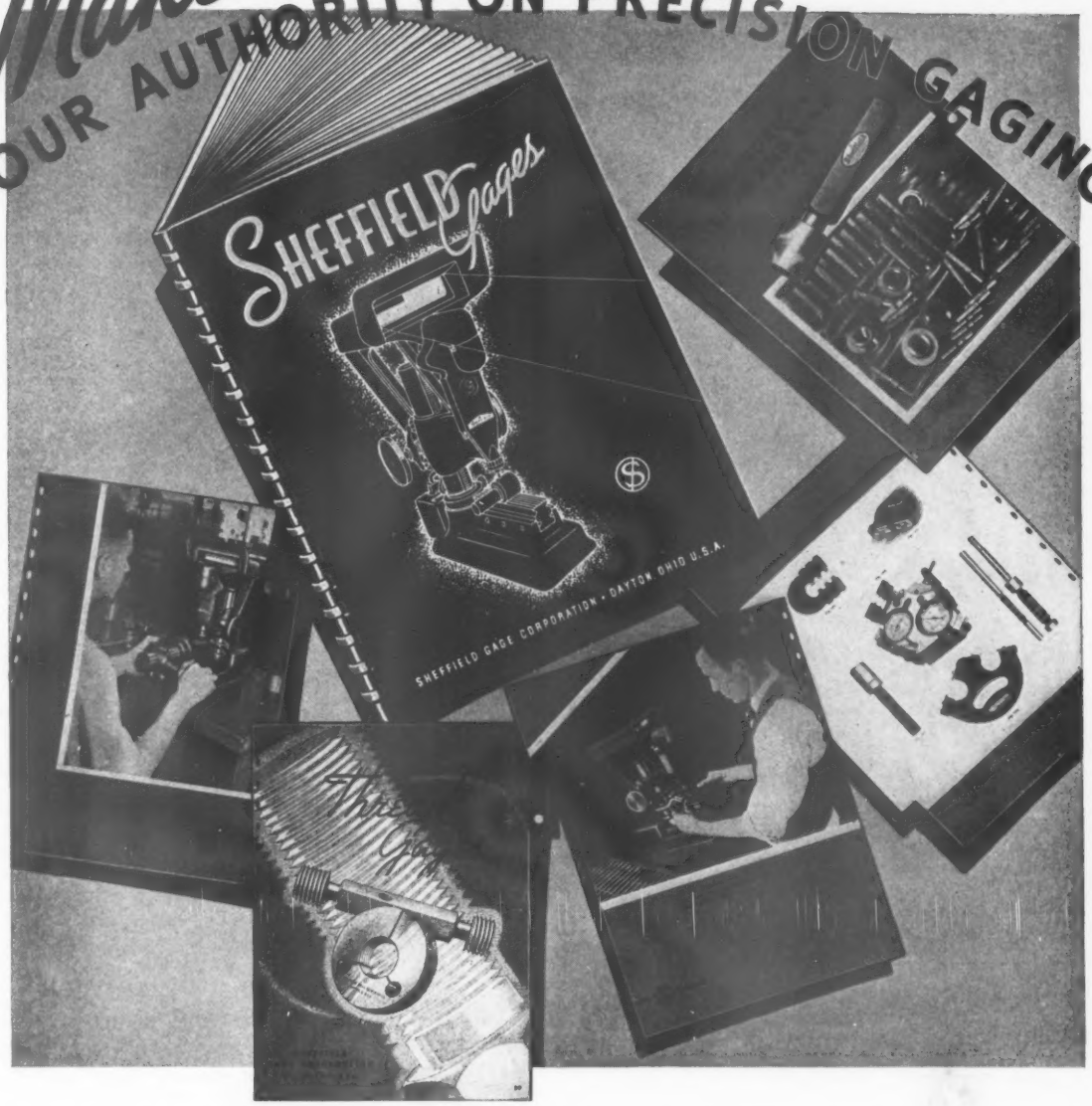
NO PACKING ON SHAFT TO ADJUST
BRONZE SHAFT BODY
PISTON CHROME NICKEL CAST IRON

LOGANSPORT MACHINE INC.,
LOGANSPORT, IND.

Make this YOUR AUTHORITY ON PRECISION GAGING



"Sheffield Gages" just off the press, gives you a complete picture of the modern precision gage and the way it is used in industry today. • It carries 178 illustrations, much tabular and explanatory information on the character and application of gages. • If you are concerned with gaging or the inspection of precision made products, write for "Sheffield Gages" on your own company's letterhead — no obligation on your part, of course. Requests for this book will be filled in the order in which they are received.

MASTER GAGE MAKERS

SHEFFIELD GAGE CORPORATION

1529 EAST THIRD STREET, *Dayton, Ohio,* U. S. A.

Handy Andy's Workshop

(Continued from page 32)

their serious, rational viewpoint on the problems of the day. It augurs well for the future of the Society, for our land and for the world, that out of this chaos and demagogery there is emerging a force that will help to swell the ranks of reason, will help to maintain a balance. Frankly, I hold these youngsters among us in very high esteem.

▼ ▼ ▼

When we were younger, Ol' Timers, and the whistle blew us in at 7 and out at 6 (sometimes) there was a minority to whom treading the brass rail was an event and not a habit, that went to night school or subscribed to correspondence courses and decided to do things on our own initiative. We did. This minority, by the way, has existed since the world was young, left its mark in the ashes and on the walls of prehistoric caves and, from all indications, will carry on as long as the old globe spins around. And, somehow, it will determine its destiny. So, if you find yourself growing pessimistic about the younger generation, if you forget that we Old Timers who have created better tools were a minority, or if you think the country is going to the dogs, just take a night off and park near any evening school, see the hordes streaming in, streaming out, then go home and sleep on it. Tomorrow will be the brighter for knowing that Youth is on the job.

▼ ▼ ▼

One thing that I like about O. B. Jones and his Detroit College of Applied Science (a long handle but it fits the skillet) is that he is training real honest-to-gosh Tool Engineers and not a bunch of theorists who have to have the non-essentials knocked out of them to make room for necessities. Not that "O.B." is weak on theory—far from it!—but he sends the boys out ready to go to work. He had me take a whack at teaching a few years ago, and one big kick I get out of life is hearing the bosses of those boys tell me that they are making the grade. They'll be good A.S.T.E.ers, too, those boys—and girls. Encourage them.

▼ ▼ ▼

From one thing to another, writing has its limitations, especially when it comes to defining sounds. English, for instance, lacks a good word for the sound of liquid being shaken in a partly filled vessel. Not so the Swedes; their word for the sound is "squalp." Learn it. Anyway, I have a neighbor not so long over the pond, and they still mix the languages a bit. The other day I came across their tow-headed little girl feeding a kitten from a toy nursing bottle. "He likes it," she explained. Then, holding the kitten close to my ear and shaking it, "Hear the milk 'squalp' inside of it?" And sure enough it did. If I ever get to Minnesoota I'm going to listen to the 'squalp' of some Svedish punsch. Eller hur?

▼ ▼ ▼

One of our Tool Engineers—never mind who—went off on a honeymoon not so long ago. His week up (it seems the boss had a program on) he asked for an extension that was somewhat reluctantly granted. But having tasted the lotus, he asked for yet another week. "Just one more week," he wired. "It's wonderful here." And the unfeeling chief wired back: "It's wonderful anywhere, come on home."

▼ ▼ ▼

If anyone hears of a Tool Engineer named Benny Loye, hanging around Pittsburgh or Philly, tell him I said to join up. And now, best regards to the gang.

H.A.

No single factor in production is more important than the quality of service rendered by cutting tools. Gairing tools are used in plants where there is a constant lookout and reward for ability to do a superior or special job better than before and where efficiency and long life in a tool are fully appreciated.

Standard and special design cover a very broad range of machine applications. Consult our Engineering Department for details. Special tools to your blueprints, or specially designed to meet your needs, are available.

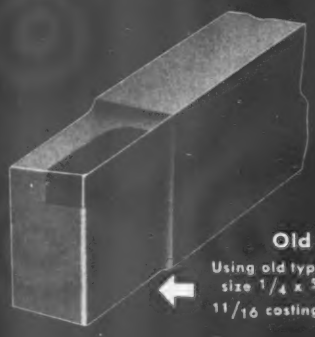
Years of accomulated experience in the designing of standard and special cutting tools is at your disposal without obligation. Write for a catalog of the Gairing line on your company letterhead.

Gairing representatives are located in all the important industrial centers.

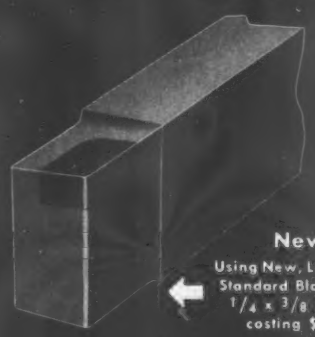
Manufacturers of
STANDARD and SPECIAL CUTTING TOOLS and TOOL HOLDERS . . . Counterbores and Countersinks . . . Counterbore Sets, Spotfacers . . . Core Drills, Reamers, Hollow Mills . . . Full Floating Holders, Facing Heads . . . Form Cutters, Boring Bars, Boring Heads . . . Adjustable Extension Holders . . . Multi-Diameter Cutters . . . Tungsten Carbide Tipped Tools.

THE GAIRING TOOL CO.
1629-35 WEST LAFAYETTE • DETROIT, MICHIGAN

This Simple Change In Tip Design Saves You $.95 On This Carboloy Tool



Old
Using old type blank size 1/4 x 5/16 x 11/16 costing $5.85



New
Using New, Low-Price Standard Blank size 1/4 x 3/8 x 9/16 costing $4.90

Both Tools Are Size 5/8 x 1-1/4, For the Same Service, And Are Identical Except For Carboloy Tip Proportions

FACTS You Should Know About NEW, LOW-PRICED STANDARD CARBOLOY BLANKS

PRODUCTION executives! Here is the way to get more Carboloy tools for your money! . . . The way to apply more Carboloy tools on more applications and spread the benefits of Carboloy more extensively throughout your plant. The way is easy . . . just take advantage of the new, low-priced standard Carboloy blanks. You save . . . well, the above case is typical. You make a substantial saving in every case.

Through simple design changes that in no way affect your desired tool performance, these new lower priced standard blanks —available in 152 sizes and 3 styles—are adaptable to more than 90% of all Carboloy tools in use today.

By using the new standard Carboloy blanks you save 15% and up on the price of Carboloy on every tool . . . you get faster deliveries . . . you reduce your designing time . . . you simplify your stock and order problems . . . and you get the benefit of quantity blank prices on single blank orders.

Investigate the new savings now possible! Send for catalog M-37.

The 3 Styles of Lower-Priced Standard Carboloy Blanks. Available in 152 sizes adaptable to more than 90% of all Carboloy tools used.

CARBOLOY COMPANY, INC.
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REG. U. S. PAT. OFF.
CEMENTED CARBIDE TOOLS

Send for New 28-Page Catalog

CATALOG M-37

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Without obligation, send new 28-page catalog showing new standard Carboloy blanks at reduced prices.

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TRY-OUTS

"LET us look for just a moment at what is going on in our national affairs. I have just come from Washington, I spent the day there yesterday. The last time I was there, I heard the story about the three drunks who went up to the ticket window and asked the agent what time the train would be in and he said, 'The train will be thirty minutes late.' And they said, 'Good, we have time for another drink.' So they went across the street and in about fifteen minutes they came back and said, 'What have you got now?' And the agent said, 'The train won't be in for another fifteen minutes.' So they said, 'We have time for a couple of quick ones.' So across the street they went again and this time they stayed too long and got back just as the train was pulling out. They ran down the platform and two of them, not having any luggage, made the train, but the third one who was carrying a big suitcase didn't make the grade. So he sat down looking dejected and the station agent came out very sympathetically and said, 'It is too bad you missed the train, but your friends made it all right.' And the drunk said, 'Yes, it is too bad, those fellows came down to see me off.' Well, you know things are run that way in Washington right now. And then I was up in Wall Street this week and up there the latest model stock ticker has a new device so that every time the market registers a new low, a door opens and two aspirins fall out. There is a great deal of confusion, a great deal of fear, a great deal of insincerity and dishonesty. The difference between an ordinary man and a politician is that the ordinary man makes his bed and has to lie in it and the politician makes his bunk and has to lie out of it.

"Now there is no reason for much of this confused thinking. What is it? Let's look at this thing for a moment from the standpoint of looking at principles, which you Engineers are accustomed to do. What is going on in the United States today is going on in the world. It is a struggle for control, a struggle between two absolutely opposed ideas. A struggle of government and social control. And these two ideas have to do with the nature and function of government. Now it is well to know the function of anything. A girl in physiology class was asked the function of the stomach and she said, 'The function of the stomach is to hold up the petticoat.' We know that is partly right. There was a man taking his first ride on a lake steamer and he called the steward and said, 'I can't find my clothes.' And the steward said, 'What did you do with them last night?' And he said, 'I put them in this little round closet with the glass door.' It is well to know the function of anything.

"What is the function of government? One man on a desert island needs no government, but two or ten or ten thousand or ten million living together in a city, country, state or nation must get together to agree upon a commonly accepted set of rules of this game of living together. And that is government. Up until the time of the founding of the Constitutional Government in America every government had rested upon this assumption—that power resides in the State, and that the individual has no rights except

(Continued on page 38)

A SIMPLE TWIST OF THE WRIST! AND HOW THEY TAKE HOLD!

Oily fingers don't slip on these Danly knurled head cap screws. The mechanic can drive them farther by hand before he has to use a wrench. He does it easier—he does it faster—and the saving in setup time is multiplied by the number he uses.

DANLY KNURLED HEAD CAP SCREWS
ARE EASIER TO USE

● In addition to easier setting, another big feature of Danly knurled socket head cap screws is in the simple and effective method of locking them in soft or hardened metal. They're made of carefully selected screw stock that has the kind of strength that stops fracturing and mushrooming. Ask for full details.

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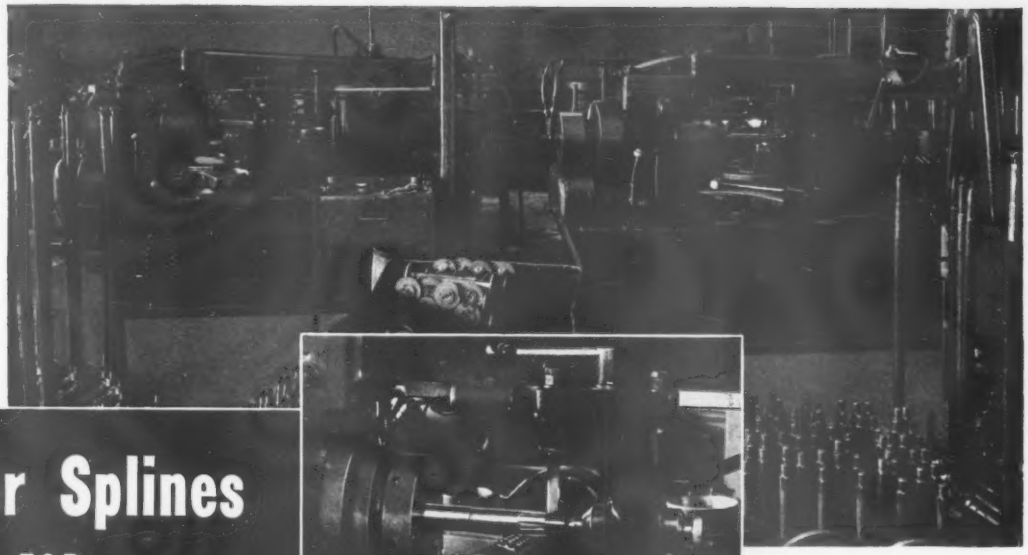
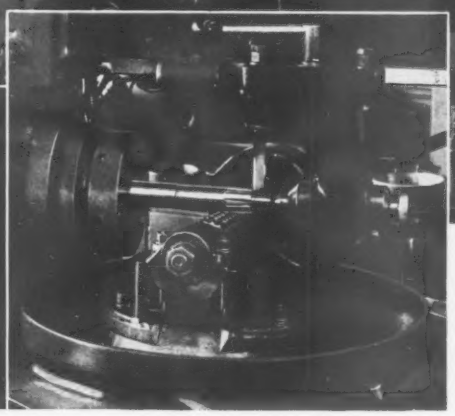
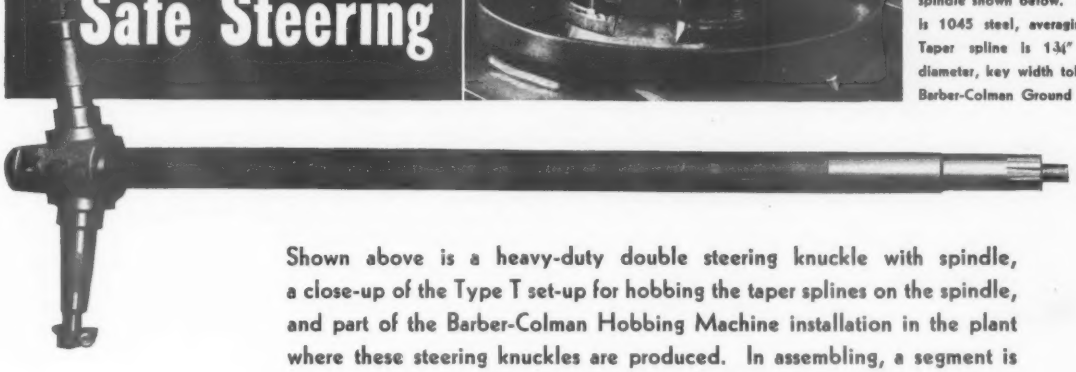
DANLY DIE MAKERS' SUPPLIES



Taper Splines FOR Safe Steering



Close-up at left shows hobbing of taper spline on end of steering-knuckle spindle shown below. Metal machined is 1045 steel, averaging 263 Brinell. Taper spline is 1¾" long on 1½" diameter, key width tolerance is .002". Barber-Colman Ground Hobs are used.



Shown above is a heavy-duty double steering knuckle with spindle, a close-up of the Type T set-up for hobbing the taper splines on the spindle, and part of the Barber-Colman Hobbing Machine installation in the plant where these steering knuckles are produced. In assembling, a segment is mounted on the end of the 46" steering-knuckle spindle. A 6-key taper spline was selected as the method of mounting the segment because the taper spline gives greater strength and contact area than other methods; provides a solid seat and metal-to-metal contact, is easily, accurately, and economically produced on the Type T Hobbing Machine; is notably reliable as a mounting means especially for vital parts in heavy-duty service. The Type T Hobbing Machine provides high production, maintains accuracy well within required limits—and can be used on ordinary straight or helical hobbing at any time if desired. Barber-Colman Ground Hobs are used on this job, as they are on many others where maximum accuracy, production, and economy are required.

For the latest and best means of mounting machine members on shaft-ends, investigate the taper spline and Barber-Colman Type T Hobbing Machine. Write for details today.

BARBER B-C COLMAN

PRODUCTS
MILLING CUTTERS, HOBS, HOBBING MACHINES, HOB SHARPENING MACHINES, REAMERS, REAMER SHARPENING MACHINES, SPECIAL TOOLS

BARBER-COLMAN COMPANY

General Offices and Plant ROCKFORD, ILLINOIS, U. S. A.

CLEVELAND, OHIO
Barber-Colman Company
3030 Euclid Avenue

DETROIT, MICHIGAN
Hodges Machinery Company
544 New Center Building

MILWAUKEE, WISCONSIN
Dumser & Schroeder
610 West Michigan St.

Try-Outs

(Continued from page 36)

those which the State may give him. In other words, the State allows the individual to do certain things. Now, that was the assumption upon which all governments had rested. But when George Washington and Benjamin Franklin and other founders of this Republic set up on the soil of the new world they were in revolt against that idea, so they set up a government on exactly the contrary assumption, namely, that power resides in the individual and that the government shall have no rights except those which the individual may give it. And if you will study the Constitution of the United States, you will see that it provides that the Federal Government shall have no power not specifically delegated to it by the people, and that is the real reason why the Declaration of Independence marks such a milestone in human history and many Americans seem to have forgotten this, that each individual comprising the State has certain inalienable rights which neither the State nor the people can take from it. 'Now, opposed to that idea which is the basis of our American Government is this idea of collectivism which goes back to Karl Marx. Communism, socialism are the return to that old assumption, it is a going back, it is the return to the old assumption of the supremacy of the State. You see that idea now in power in Russia, in Italy and in Germany. There is where your struggle is. It lies between these two ideas, and it is essential that we, as Americans, think clearly on this subject if we are to avoid some very serious results.

"Now, the second antidote to fear is faith. Man stands in a circle of light, and all about him there is darkness. And faith is that which enables him to step out of the light into the darkness. And in the lives of us all there come times when that is necessary. When we have got to step out of the circle of the known into the darkness of the unknown and only faith can enable us to do that. Faith in ourselves. Faith in our fellow man. Faith in God. Sometimes you find a man who says, 'Well, I have no use for faith. What I know I know.' Very dogmatic. No use for faith! Then he will go out and buy a secondhand car. You can't live in this world without faith. Last night in Baltimore I went down and got into a sleeping car. I didn't know anything about the engineer that had charge of that train. I didn't know anything about the fireman, nor the train dispatcher whose duty it was to see the trains routed properly for the Baltimore and Ohio Railroad. I didn't know anything about the men along the right of way whose duty it is to look after the track and see if it is in good condition. And I didn't know anything about the chaps who look after the rolling stock, tend the switches and see that they are properly thrown. I didn't know anything about them. The Pullman porter and Pullman conductor are the only ones I saw. I went down and got into my berth, having faith that all through the night those men, unseen to me, would perform their duties faithfully and well. And when the morning came I would find myself well on the way to my destination. You can't live in this complex modern world without having faith in your fellowman. Now here is a piece of paper nicely engraved with a picture of George Washington. It is a dollar bill and it is worth a dollar. Of course, it is really only worth sixty* cents, but it says it is worth a dollar and you will accept it as though it were. Why are you willing to accept that for what it says it is? Because there is a promise back of that money, a promise to pay and you have faith in that promise.

* At time of Mr. Newcomb's address—April, 1936.

JACOBS
SINGLE PURPOSE
CHUCK
For High Production Drilling, Reaming and Tapping
★
Solid Taper Shank Perfectly Fits the Spindles for Absolute Accuracy
★
Positive Drive — No Slippage
★
Powerful collet jaws tightened with a wrench eliminate wear and damage to machine spindle—securely lock tool shank in engagement with the positive drive.
★
For Dimensions - Price List - and Part Numbers Write for Bulletin 6A
THE JACOBS MANUFACTURING CO., Hartford, Conn.
Jacobs Chucks

A.S.T.E. Chapter News

(Continued from page 20)

ern Pennsylvania Industrial Supervisor's Conference held at Conneaut Lake, Pa. Aside from the meetings there was golf and fishing. The fellow (John Senkewitz) with the longest arms caught the biggest fish. But they got away.

We were glad to read in "The Tool Engineer" of our fellow member Malcolm F. Judkins. As Chief Engineer, we wish him well. Also the column "Try-Outs" in July issue is well worth your reading. So if you missed it, better turn back and read it now.

At a recent meeting of the Westinghouse Trades Apprentice Alumni Association three A.S.T.E.ers were elected to office. They are John H. Sekerka, President; John H. Thomas, Vice-President, and R. W. Mallick, Treasurer.

A story from E. L. Ross is worth listing here. It seems he was going over one of Pittsburgh's many bridges when he met a fellow who was going to end it all. As he was about to go over the railing, Ross caught him by the arm and said: "What is the trouble, my friend?" "Oh, the world is all wrong. Everything is against me. Life is not worth living. Things are in a terrible mess." "Well, now," says Ross, "Let's you and me take a walk around the block and talk this thing over." So they did, and when they returned to the same spot on the bridge, they both jumped in.

We would be glad to hear from Pittsburgh members who are on vacation. Just drop a line to above address and we will answer in this column.

Would like to have those wooden cherry forks offered by Handy-Andy. Wooden you? I guess the answer—a bun—is the lowest form of wheat.

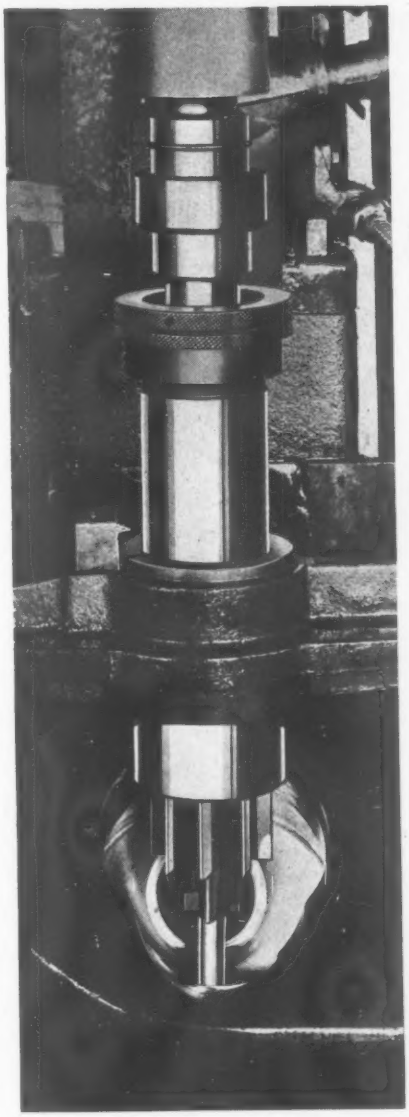
Ringling Bros. Circus was in Pittsburgh this month and L. D. Rigdon, our program chairman was there. As they were waiting in a long line to get in the big tent he kept saying, "I wish I had our piano, I wish I had our piano." His wife said, "What on earth do you want with our piano?" His reply, "Our tickets are on it."

Harry Jones was to meet Ed Griffiths at the last meeting. So he said to Ed, "Don't bother to wait outside, if I get there first I'll mark an X on the sidewalk." "All right," said Ed and "If I get there first I'll rub it out."

Will see you next month.

(Continued on page 48)

AVIATION ENGINES DEMAND *Accuracy!*



In this operation four closely held surfaces are prepared for valve seat inserts with one cut.

TWO ten thousandths of an inch variation often rejects expensive airplane engine parts.

Eclipse tools have been predominantly used in the manufacture of all well-known American aviation engines since 1914!

The radial cylinder head shown below is just one of many parts being machined with Eclipse multi-diameter bushing-guided tools.

Eclipse

Factory sales engineers in all industrial centers.

ECLIPSE COUNTERBORE COMPANY
DETROIT 7410-30 ST AUBIN AVE MICHIGAN

Small Manufacturers Profit by Tool Engineering

(Continued from page 10)

a wide difference between the estimated and actual labor costs. Where short runs are common it is advisable to have the speeds and feeds recorded and a time study made so that future runs of the same part can be duplicated without further expense.

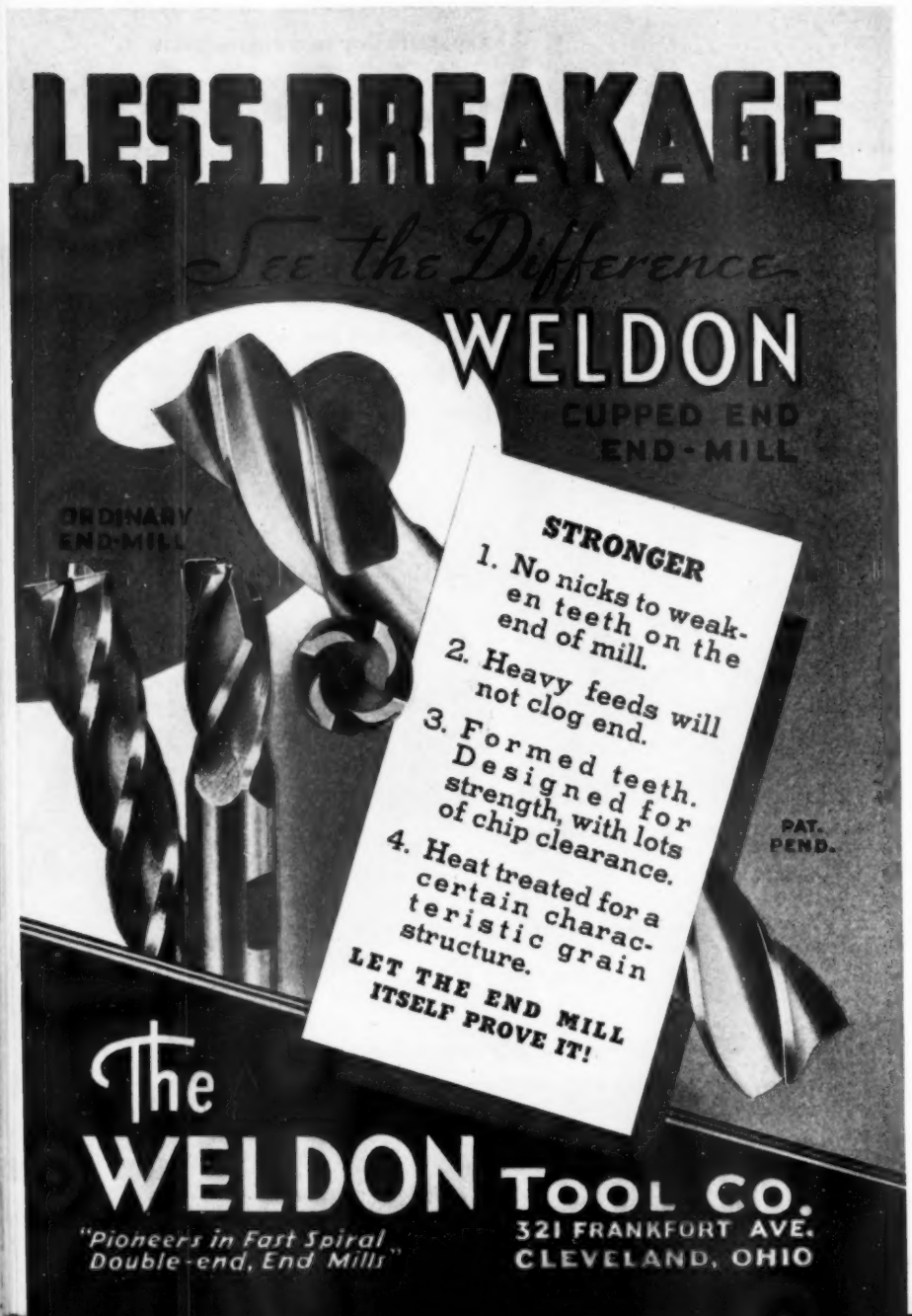
Records Important

The keeping of accurate records plays an important part in the functioning of any system and Tool Engineering is no exception, especially when numerous parts are run over the same tool line-up with minor changes to suit each particular part. So to suit each condition the Tool Engineer must develop a chart or table listing the common dimensions of similar parts, their locating points and the correct tool or fixture details required to make the set up. This data must be checked and brought up to date each time a new part is scheduled, otherwise duplication of tooling and the corresponding increase in the tool inventory cannot be avoided. This tabulation also provides a valuable machine load chart, and as machine capacity in most plants is usually limited it becomes necessary to keep an accurate check to prevent overloading and the consequent failure to make production and delivery schedules.

One of the greatest assets to any company, and one which is not fully realized by many, is the close cooperation between the Tool Engineering and Product Engineering Departments. Before the part prints are released to the Manufacturing Department if each part is studied by the Tool Engineer as to its machinability much needless expense and many headaches may be avoided. Often minor changes in design can be recommended that will not affect its functioning but will eliminate difficult machining operations; the addition of driving lugs to chucked castings that are subject to distortion while being clamped or are difficult to hold is often the solution to a vexing problem and it is far better to provide for this before the castings are made than to have to machine the first lot of castings with a high scrap loss and eventually have to change the design through necessity, causing additional expense by altering the tooling. Further teamwork between the Tool Engineering and the Foundry permits better control of castings relative to locating points and stock allowances for disc grinding when substituted for milling can be cut to a minimum.

As that school of psychology, the "behaviorists," define thinking as merely anticipation of probable effects from combinations of conditions based on past experiences, so we might define Tool Engineering, and the question resolves itself into one of which is the better way—to anticipate certain effects and provide and control them based on our past experience or to use the old cut and try method.

For a little longer the decision rests with the management but with the rapid mechanization of industry and the increasing keenness of competition the old method will by its own failings eliminate itself from modern manufacturing, much to the sorrow of the Jack of All Trades but to the benefit of society as a whole in the form of a better product at a lower price.


LESS BREAKAGE
See the Difference
WELDON
CUPPED END END-MILL
ORDINARY END-MILL
STRONGER
1. No nicks to weaken teeth on the end of mill.
2. Heavy feeds will not clog end.
3. Formed teeth. Designed for strength, with lots of chip clearance.
4. Heat treated for a certain characteristic grain structure.
LET THE END MILL ITSELF PROVE IT!
PAT. PEND.
The WELDON TOOL CO.
"Pioneers in Fast Spiral Double-end, End Mills"
321 FRANKFORT AVE.
CLEVELAND, OHIO

Ajax Flexible Coupling Appoints

Roloff Engineering Company, 610 W. Michigan St., Milwaukee, Wisconsin, are now sales agents for the Ajax Flexible Coupling Company.

Announcing

KNU-VISE

"DOUBLE" OR "KNUCKLE" ACTION VISES

Powerful - Compact - Unique

Double action fixture vise. High grade materials and workmanship. Accurate machining. Cut tooling costs on your drilling, grinding, reaming, milling, centering and assembling operations.

Jaw inserts supplied as a blank—finished to customer's own requirements.

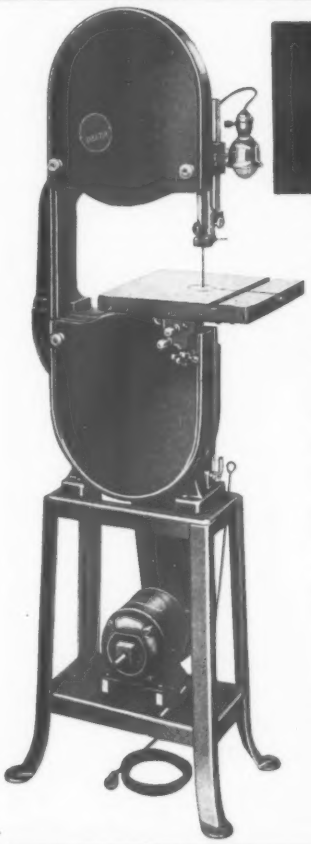
MODEL NO. 325
"KNUCKLE ACTION"

Tremendous pressure with less effort on handle. A common base with quick action. Work is held rigidly. Easy to load and unload. Always in plain sight of operator. Plenty of chip room.

Send for literature

KNU-VISE PRODUCTS COMPANY

6432 CASS AVENUE **DETROIT, MICHIGAN**



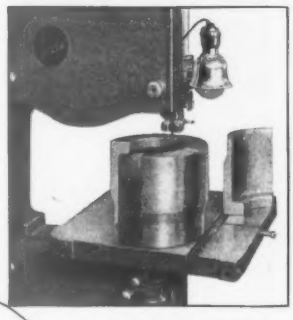
New Metal Cutting 14 inch BAND SAW

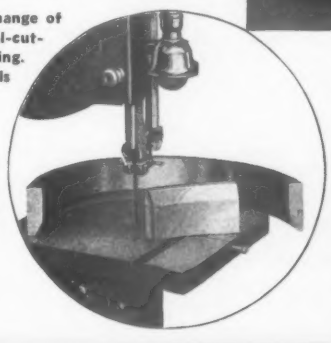
The regular 14-inch Delta band saw, fitted with countershaft to reduce the speed, has been used in hundreds of shops for cutting Iron, Steel, Brass, Bronze and Aluminum bars, shapes and sheets; in foundries for cutting off gates, in die-casting shops for trimming and sawing castings.

Here is a new and improved back-geared model which is even more ideal for this work. It is the perfect machine for the general machine shop, toolroom or experimental shop, where many different materials must be cut.

It takes the place of a power hacksaw in cutting off bars and shapes; It is used in the toolroom for sawing off tool, die and fixture stock; it will cut uniform strips from sheets; it saves hours of time in cutting templates and similar tools, and will cut almost any material, such as asbestos, mica, vulcanite, fiber, etc.... difficult to cut by ordinary means.

It will "double in wood," too, by a simple change of belts, as provision is made for four low metal-cutting speeds and one high speed for wood sawing. Write for special circular giving full details and specifications.





One of these draw-die segment rings was impractical to cut on the milling machine because of the diameter of cutter required; the other because the diameter of the ring was too large for the milling machine. Both, however, are cut with ease and speed on the Delta band saw. Try your next "awkward" job on one of these versatile tools.

$79.50 **14" back-geared Metal-Cutting Band Saw, complete with guards, 8" arbor pulley for wood and cone pulley for metal. With one 14-tooth metal-cutting blade. Without light attachment, belts, stand, motor or motor-pulley. Shipping weight 175 lbs.**

DELTA MFG. CO.

685 East Vienna Ave.

MILWAUKEE, WISCONSIN

Special High Production Machine

(Continued from page 11)

chine are supported by heavy guide rails, as illustrated, to provide the proper alignment with the trunnion fixture. The head at the left end of the machine has nine spindles so arranged that the first three countersink, the next three drill the holes part way and the remaining three finish drill the holes. The head on the opposite end of the machine has six spindles—three for countersinking and the other three for drilling the holes part way. All of the spindles are ball bearing mounted and provided with pressure lubrication. Adjustable sleeves are furnished on all spindles to accommodate drill wear. Each head has an extra guide bar which enters the fixture after each index, to provide additional accuracy and rigidity.

The fixture (which is of the trunnion type) has a cast iron frame with an aluminum trunnion body mounted on ball bearings. The individual work-holding units located on the periphery of the trunnion body, are designed for convenience of repair, replacement and interchangeability. Coolant is manifolded through the trunnion, permitting it to be shut off at the loading station while the machine continues its operating cycle.

Automatic indexing is accomplished by a ratchet mechanism operated from a cam attached to the left hand multiple drill head. The indexing takes place on the advance stroke of the hydraulic power units.

A remote control valve with a single handle, is conveniently located for operating the machine. The valve is so designed that by moving the handle in one direction, both units are started simultaneously. The cycle of the machine can be interrupted at any time and the units reversed by moving the handle in the opposite direction. Each electrical motor is provided with an individual magnetic line starter with a separate start and stop push button. A master stop button is also provided for controlling all motors.

The base or bed of the machine is of welded steel construction and is provided with an inbuilt coolant tank, a work basket and chip screens. The coolant pump and motor can be located inside or outside of the machine as preferred. All hydraulic piping is accessible through covered ports or openings located at the rear of the base.

The machine is operated as follows: Three bolts are dropped into the individual work-holding units of the trunnion fixture at the loading station. At the next index the parts pass under a spring cam, which forces the parts into accurate position. As the fixture continues to rotate, a similar cam contacts the clamping lever on the side of the fixture which accurately locates, and rigidly locks the parts in position. The work is positioned for depth and is located with relation to a flat on the head of the part.

At the first work station, each of the three parts is countersunk from both sides with 1/4" drills registering in drill jig bushings located in each individual fixture. At the next station the hole is drilled 1/3 of the depth from both sides with a 1/8" drill without the use of drill bushing, by picking up the spot formed by the countersink drills. At the third station the hole is finish-drilled from the left hand side of the machine. Three inspection plug gauges attached to the multiple head, are automatically inserted in the three holes which have been drilled. If the gauges fail to enter the drilled

(Continued on page 46)

WE ASK YOU...

Are your roughing inserted tooth face mills designed for maximum blade life?

They would be if you were using the GD & GD inserted cone type design.

The adjustment is positive and uniform, making it unnecessary to scale each blade as it is set out. The direction of the adjustment is such that it compensates for major blade wear.

THINK IT OVER

GODDARD & GODDARD CO.

DETROIT

New Equipment

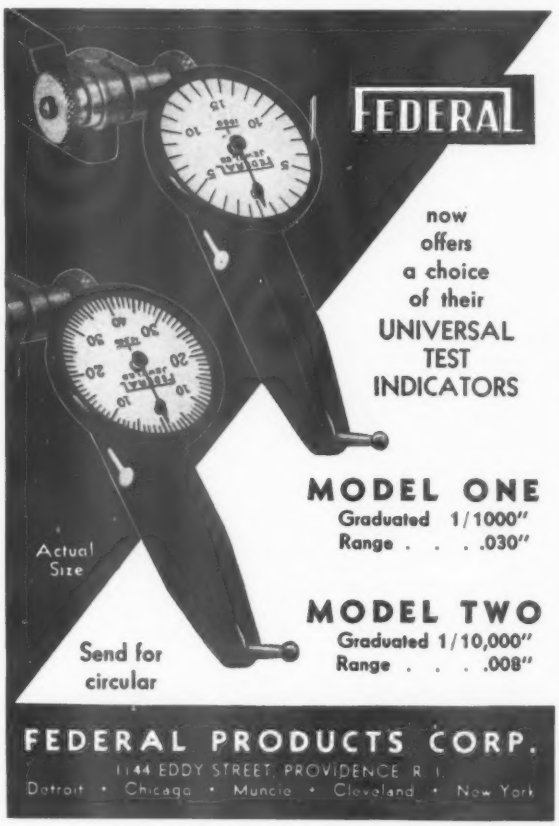
(Continued from page 26)

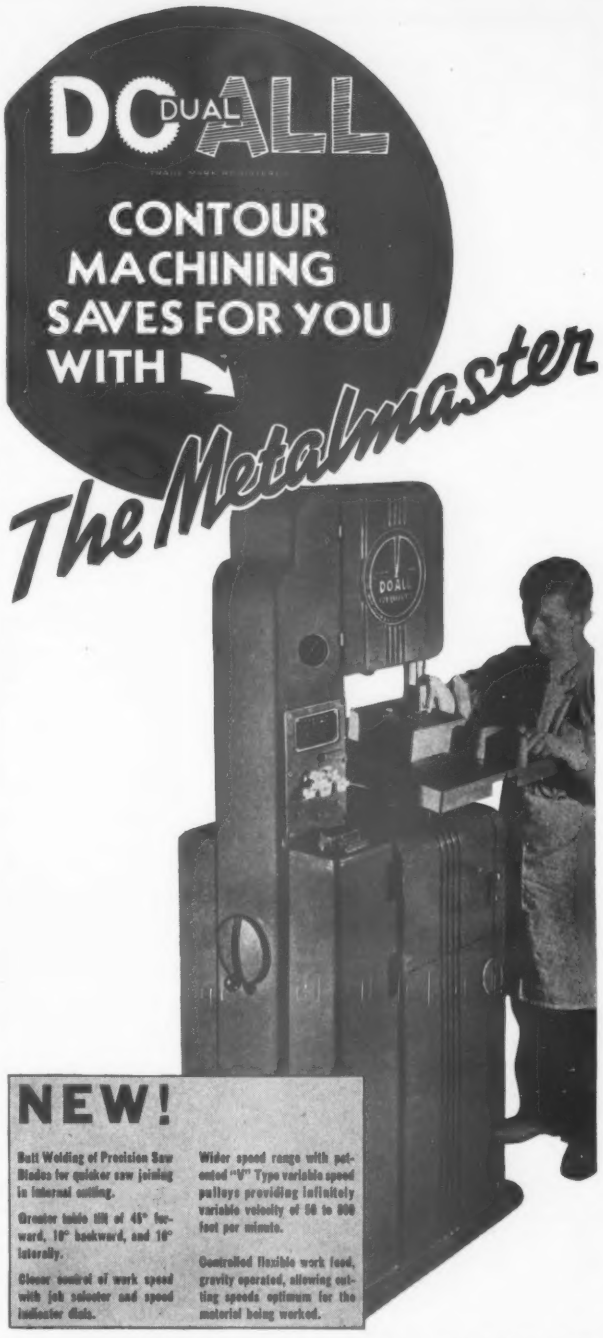
Buhr Adjustable Holder

Micro-Holders is such that no tools are required to adjust the taper adapter or extension. A slight turn of the locking sleeve locks or unlocks the adjusting nut and a turn of the knurled adjusting nut to right or left gives a measured adjustment in thousandths of an inch. The measured adjustable feature of these holders provides for unequal wear of tools, variation of tool lengths, and reduces set up time when used for drilling, reaming, tapping, spotfacing and counterboring holes of different depths.

The Micro-adjustable holders and adjustable extension holders are intended to be used in the spindle of a drill press, multiple heads, cluster heads or other drilling, reaming or counterboring machinery when the spindles are equipped with a standard Morse Taper.

The Buhr Micro-adjustable Nose Pieces are designed to incorporate a measured adjustment on the end of a drill spindle, multi-spindles of cluster heads. After the spindle has been threaded to take the nose piece, either Buhr, General Motors or Chrysler adjustable adapters can then be used.




DC DUAL ALL
CONTOUR MACHINING SAVES FOR YOU WITH
The Metalmaster
NEW!
Butt Welding of Precision Saw Blades for quicker saw joining in internal cutting.
Greater table tilt of 45° forward, 10° backward, and 10° laterally.
Closer control of work speed with job selector and speed indicator dials.
Wider speed range with patented "V" Type variable speed pulleys providing infinitely variable velocity of 50 to 800 feet per minute.
Controlled flexible work feed, gravity operated, allowing cutting speeds optimum for the material being worked.

Contour machining has an even wider application with this new combination sawing and filing Metalmaster. Put this machine tool to work for you. It gives the ordinary mechanic the output of an expert one and saves time and material as well.

1. Send for 4-page descriptive Metalmaster folder.
2. Write for formal quotations.
3. Read Contour Sawing Handbook, sent free when requested on business letterhead.

CONTINENTAL MACHINE SPECIALTIES
1301 South Washington Avenue
MINNEAPOLIS - - MINNESOTA

New Literature

of Interest to the Tool Engineer

American Broach & Machine Co., Ann Arbor, Michigan, division of Sundstrand Machine Tool Company of Rockford, Illinois, have just issued a circular describing their new Type H Horizontal Hydraulic Broaching Machine. The circular contains complete information about these new machines which are made in five sizes and are adaptable for a wide variety of internal and surface broaching operations. Individual features and advantages of the machines are fully described with a complete page devoted to specifications.

▼ ▼ ▼

Fourth edition, Procedure Handbook of Arc Welding Design and Practice, just reprinted for the fourth time, includes the latest weld symbols adopted by the American Welding Society in May and a new introduction to part six, "Designing for Arc Welded Steel Construction of Machinery," according to announcement just received from the publishers, The Lincoln Electric Company, Cleveland, Ohio. The addition of the new material is included at this time rather than being deferred until publication of the fifth edition. The book is the recognized authority on arc welding and its widespread acceptance is indicated by the fact that its sale has exceeded 40,000 copies. Price $1.50 postpaid in U.S.A.—$2.00 elsewhere.

▼ ▼ ▼

High Speed Hammer Company, Inc., 315 Norton Street, Rochester, N. Y., has just issued a circular describing a "High-Speed" Sensitive, Precision Drilling Machine. The circular describes the principle employed in the High Speed machine of a separate arm for actuating the work spindle through ball thrust bearings, which construction, it is claimed, simulates the effect obtained in the jeweler's drill where the spindle is fed downward by pressure of the finger on top of the spindle.

▼ ▼ ▼

Standard sizes and styles of hard carbide tool blanks have been adopted by the hard carbide industry in July 1937. By the selection of about 100 sizes of carbide blanks for tool tips, made in three styles of shapes, the industry expects to effect economies in manufacture and distribution which have been reflected in price reductions for these standard blanks. Tools made from these standard blanks have likewise been repriced.

▼ ▼ ▼

The Vanadium-Alloys Steel Company announces the publication of a new catalogue of tools and blanks, containing much useful data for tool makers using carbide blanks, or machine shops using tools tipped with these blanks. Copies may be obtained by application to the Vanadium-Alloys Steel Company, Vascoloy-Ramet Division, North Chicago, Illinois, or any of its offices.

▼ ▼ ▼

Continental Diamond Fibre Company, Newark, Delaware. A new bulletin has just been issued on Celoron Silent Gears which is a rather complete treatment of the subject. "Celoron" is a laminated plastic material which may be machined in any manner in which it is possi-

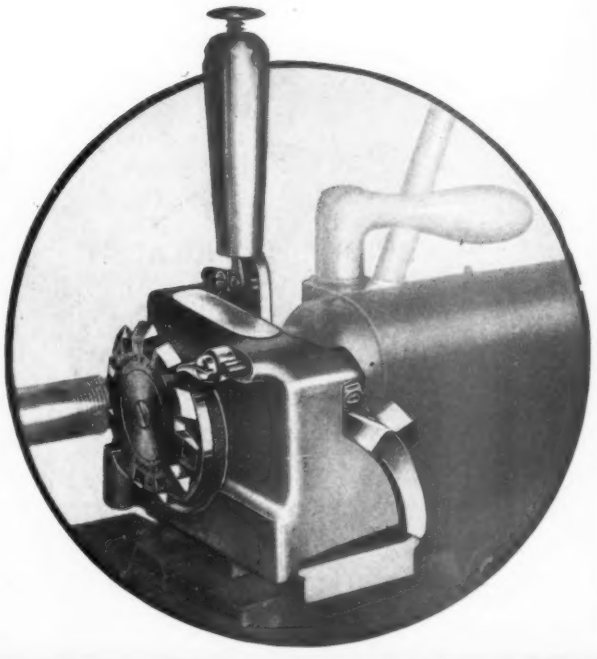
(Continued on page 46)

RIVETT IMPROVED THREAD TOOL

Mounts on any screw cutting engine lathe. An unskilled operator can use it. For any diameter or form (except square) of six pitch or finer.

THE THREAD TOOL is a holder for a ten tooth cutter with means for indexing the cutter to present each of the ten teeth successively to the work, and with adjustments for controlling the size of the finished thread.

THE CUTTER is a disc of the best tool steel with ten teeth, each tooth having a prescribed increase in radial length over the preceding tooth, thus comprising, in effect, ten cutting tools. The first nine teeth rough out the thread progressively in nine heavy measured cuts, and the tenth tooth finishes the thread. The responsibility of the operator is reduced to indexing the cutter and reversing the lathe. The thread tool does the rest.



Bulletin 110-A

RIVETT LATHE & GRINDER, INC.

BRIGHTON, BOSTON, MASS.

Q-C ENGINEERING

WHAT IS THE USEFUL LIFE OF Q-C FIXTURES? A FAIR QUESTION

This of course varies. We do not know of one having worn out in the last fifteen years, but we do know of countless installations that are on high production which have been retooled year after year over this period.

Type No. 3000 Q-C Jig. Tooled for Drilling Clutch Housing. 83 sizes available in this type.

SEND FOR COMPLETE DATA

WHY NOT INSTALL THESE LONGER-LIVED JIGS IN YOUR PLANT AND SECURE THE CONSEQUENT SAVINGS

Eleven Types — 704 Sizes

Q-C ENGINEERING PRODUCTS
3801 Trenton Ave. Detroit, Mich.

Designers and Builders of all types of production tools, dies and fixtures, standardized fixture locks, units and rotary tables, live centers and locating pins and rest buttons.

ALWAYS RENEWABLE

THROUGHOUT ITS LONG SERVICE LIFE!

THE SEPARATE HIGH-SPEED STEEL BIT IS ADJUSTABLE IN LINE OF WEAR, AND IS QUICKLY REPLACED AT SMALL COST WHEN FINALLY WORN OUT.

O K Tool Bits are made of the best high-speed steel, drop forged and correctly heat treated for edge retention; the holders are of chrome nickel alloy steel, drop forged, and specially heat treated for toughness. You invest in the higher priced high-speed steel only where needed—in the bit instead of in the entire tool. Besides, much time is saved by always having the right bit handy, accurately shaped and ground for the job.

THE TRADE OK MARK **SYSTEM**
OF INSERTED-BLADE METAL CUTTING TOOLS

THE O K TOOL CO.
SHELTON, CONN., U.S.A.

New Literature

(Continued from page 44)

ble to machine metal—but much more rapidly. It is one-seventh the weight of brass, one-sixth the weight of steel, one-fifth the weight of cast iron and one-half the weight of aluminum. Other interesting properties of the material are explained in the bulletin with specific data on tensile strength, flexural strength, compressive strength, modulus of elasticity, shearing strength, coefficient of expansion, specific gravity and brinnel hardness. When writing for copies mention "The Tool Engineer."

▼ ▼ ▼

Gisholt Machine Company, Madison, Wisconsin. A circular has been issued by this company covering their Boring Bars and Reamers. The circular is profusely illustrated and describes in full detail various features of the Gisholt Boring Bars, cutters, parts and accessories for Gisholt Piloted Boring Bars, also solid and adjustable Gisholt manufacturing reamers, blades for Gisholt reamers, floating arbors for shell reamers, etc. Mention this publication when writing for your free copy.

▼ ▼ ▼

The engineering drafting room chart brought out last fall by The Lincoln Electric Company, Cleveland, Ohio, to provide, in concise ready reference form, data necessary for producing arc welded designs is being revised according to announcement just received from the company. The feature of the new chart will be the latest weld symbols adopted by The American Welding Society in May. Adoption of the new symbols by the Society is expected to go a long way toward simplifying welded design by making it possible to very clearly convey the information from the designer to the workmen. The new arc welding symbols, reproduced clearly and with complete explanation on the new chart, provide means of placing complete welding information on drawings. Copies of the chart can be obtained by writing The Lincoln Electric Company, Welding Engineering Department, Cleveland, Ohio.—Mention "The Tool Engineer" when writing.

▼ ▼ ▼

M-B Products, 132 East Larned Street, Detroit, Michigan. A circular describing the M-B "Heavy Duty" Air Grinder and "Super-Speed" Air Grinder. Exclusive features claimed for this tool are three ranges of speed, three stages of power and a simple governor which regulates a maximum speed.

The M-B "Super-Speed" Air Grinder is described as having a capacity of 100,000 R.P.M. on 100 lbs. air pressure.

▼ ▼ ▼

Pratt & Whitney, Hartford, Connecticut. A new circular just issued describing the Keller Cutter and Radius Grinder, describes in detail mechancial features of this machine for sharpening a wide variety of cutters which must be ground accurately. Contains many illustrations showing close-up views of individual applications for different type cutters, etc. Full specifications of the cutter and radius grinder Type R-6 are given, as well as a description of additional equipment such as tracer grinding and turning attachment, sliding work holding spindle unit, face mill grinding attachment, short tooth rest unit, etc.

Joins Hanson-Whitney

Berry Thomas, for many years with the Ford Motor Company, has joined the Detroit offices of Hanson-Whitney in the capacity of factory representative.

Among the complete line of Starrett Dial Indicators are many models especially adapted for application to production inspection fixtures. We are also prepared to give particular attention to special gaging problems. For complete information, consult second edition Starrett Dial Indicator Catalog T. A copy free on request.

THE L. S. STARRETT CO.

World's Greatest Toolmakers
Manufacturers of Hacksaws Unexcelled
Steel Tapes—Standard for Accuracy
Dial Indicators for Every Requirement

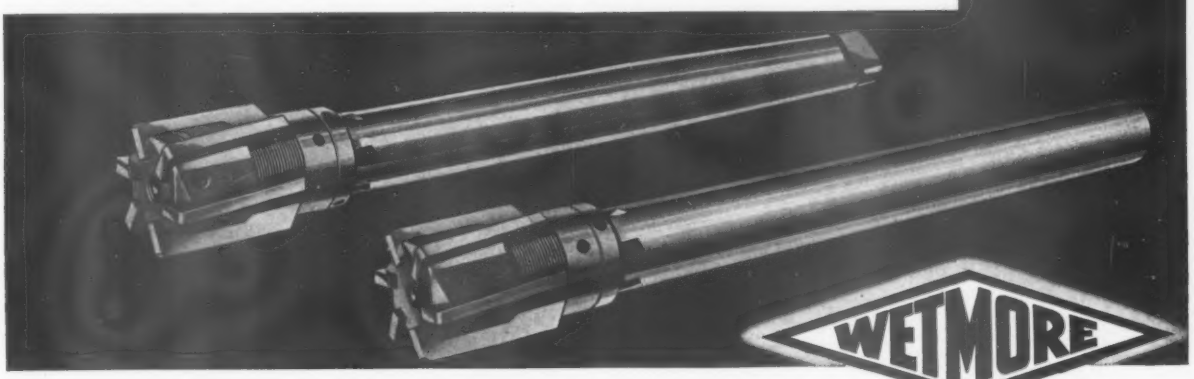
ATHOL, MASS., U. S. A.

BUY THROUGH YOUR DISTRIBUTOR

Starrett Dial Indicators

THE STANDARD OF QUALITY AND ACCURACY IN ADJUSTABLE MACHINE REAMER

The Type No. 11 Wetmore Reamer is known for ease of adjustment, long blade life, cutting performance . . . because of the famous Wetmore design. Write for Catalog No. 36.



• SPECIAL TOOLS

Designers and tool engineers are invited to avail themselves of our counselling service on all reaming operations—standard or special. We build practical and efficient special tools to decrease your manufacturing costs.

WETMORE REAMER COMPANY, Dept. TL, 420 N. 27th St., Milwaukee, Wis.

A Swartz Installation

Part Cluster Gears, Operation-Drill Center Hole.

Tool-Four SWARTZ Std. fixtures with Spring follow-up to heads. Part located by three point adapter in head and combination gripper and locator in base.

Ask for catalog 6-32D

SWARTZ TOOL PRODUCTS CO. INC.

5259 WESTERN AVE. **DETROIT, MICH.**

Represented by

Cleveland—J. W. Mull, Jr.
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Pittsburgh—J. W. Mull, Jr.
Toledo—J. W. Mull, Jr.
Philadelphia, Pa.—Morgan Tool & Equipment Co.

Canada—Hi-Speed Tools, Ltd., Galt, Ont.

A.S.T.E. Chapter News

(Continued from page 39)

RACINE

T. J. Santry, Chapter Publicity Chairman, 1615 Racine Street, Racine Wisconsin

The Racine chapter September meeting is tentatively arranged to be held on Monday night September 13, at which time they expect to have a representative of the Nash-Kelvinator Corporation to speak to them on Air Conditioning. A business meeting will be held in connection with this meeting for the purpose of holding a special election.

Mr. Robert Keith, a member of Racine Chapter A.S.T.E. died June 6th, 1937. He was works manager for the J. I. Case Tractor Works and had been active in the affairs of the Society of Automotive Engineers. His death came suddenly just after he had attended the graduation exercises of his son at Iowa State College.

Sterling-French Now Agents for Arter

Sterling-French Machinery Company, 423 New Center Building, Detroit, announce their appointment as agents for the Arter Grinding Machine Company of Worcester, Massachusetts.

Production Perspectives

(Continued from page 18)

Union workers of **Waterbury Buckle Co.,** Waterbury, returned to their jobs June 29 after settlement of a three weeks' strike which closed the plant, having won several concessions. . . . **American-Swiss Tool Co., new concern headed** by **Ernest Bertsche** of Hartford, has **started operations** in Rockville, **making dies for bakelite moulds. . . . Simmons Diamond Die Corp has been incorporated in Stamford. . . . Union Mfg. Co.,** New Britain, chucks and gray iron castings, is **altering its plant** interior **to provide for new conveyors and other equipment. . . . Hartford Special Machine Co.,** Hartford, is **planning a one-story addition. . . . Miller Co.,** Meriden, **will build a large addition** to its rolling mill **at a cost of $35,000** to expand manufacture of sheet and strip brass and phosphor bronze. . . . **Allen Mfg. Co., Hartford,** safety set screws, **will erect a new two-story factory building on Sheldon street. . . . Landers, Frary & Clark,** New Britain, has **completed plans for a five-story addition to provide extra space for washing machine and refrigerator divisions. It will cost more than $150,000. . . . Clayton S. Jenkins, treasurer of Collins Co.,** Collinsville, axes and edge tools, has **resigned** after nearly 51 years of service. . . . **Benjamin F. Conner** and **Dwight G. Phelps,** managers respectively of the plastics and electrical divisions, **Colt's Patent Fire Arms Mfg. Co.,** Hartford, have been elected vice-presidents. **. . . Manning, Bowman & Co.,** Meriden, electrical appliances, will **introduce two new lines this fall,** although operating at full capacity on present lines.

West Coast

The Bendix Aviation Corporation is expanding both its automotive and aircraft operations in Southern California and has **acquired** a twenty-year lease on **another large hangar at the Burbank Airport,** western terminal of most of the transcontinental airlines. Bendix Aviation already controlled one hangar through a subsidiary, **Pacific Air Motors Corporation. "Both plant facilities and personnel are being expanded.** In addition to the new hangar we have just taken an option on a large piece of vacant property adjoining Burbank Airport for possible future expansion," declared **Vincent Bendix, president.** In connection with the expansion plans, S. F. Dupree, president of the

(Continued on page 50)

If you need a Set Screw with Guts specify-

Fig. 232

UNBRAKO

HOLLOW SET SCREW

Even under the severest punishment, "UNBRAKO" Hollow Set Screws hold fast and stay put. Made of alloy steel, properly heat-treated —they're tough and hard so points don't mushroom and hex won't round. *Details on request.*

STANDARD PRESSED STEEL CO.

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PROCUNIER

HIGH SPEED PRECISION

TAPPING Attachments

with the NEW **"TRU-GRIP" TAP HOLDER**

The most sensible tap holder that ever gripped a tap.

ONLY Procunier tappers have the patented three-point balanced heat treated gear reversing mechanism. This special feature distributes the pull among three gears instead of one, reducing strain and wear to the minimum and giving longer life.

ONLY Procunier tappers have the new "Tru-Grip" Tap Holder. Full particulars gladly supplied.

Procunier Safety Chuck Co.

12-18 S. CLINTON CHICAGO, ILL.

When Planning the Removal of Metal

Remember the Advantages of Broaching

The modern trend in speed, accuracy and in reduction of manufacturing costs is continuously increasing the application of broaching.

We invite you to take advantage of the service of our engineering staff.

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Manufacturers of

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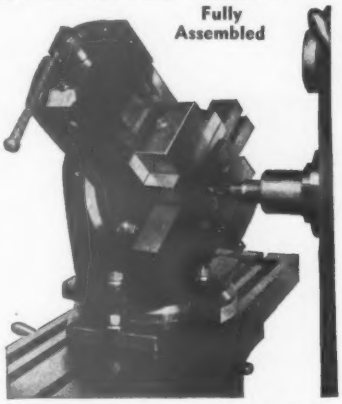
DO IT --

Better · Faster - For Less!

with ODIN UNIVERSAL

Precision Vises **Swivel and Plain**
with Interchangeable Jaws and
Hardened and Ground Parallels



They quickly pay their costs in savings on High Tool Costs —Expensive Fixtures —Patterns and castings—Extra Set-Ups.

Investigate the money saving possibilities of ODIN VISES

Write today for full facts and prices.

Let us show you how to make cheaper and better jigs and fixtures at a greatly reduced cost—with a great saving in time.

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CHICAGO

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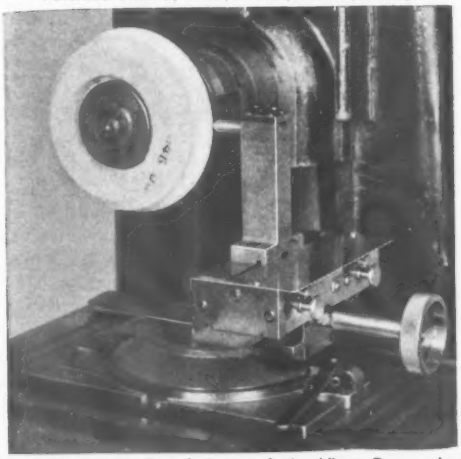
110 S. Dearborn st.,

Telephone
Franklin 3281

VINCO ANGLE TANGENT TO RADIUS DRESSER

for Internal, External and Surface Grinding Machines
Patented June 5, 1934, other patents pending.



One of the outstanding features of the Vinco Dresser is the basic patented principle of dressing angles and radii on abrasive wheels from the same axis without moving the diamond, angles and radii are always accurate and tangent. The illustration above shows The Vinco Dresser in use on a surface grinder dressing angles and radii on an abrasive wheel. The Vinco Dresser is precision made by highly skilled mechanics, Dresser parts subject to wear are hardened, rough ground, normalized, finish ground and lapped. Stops on the Index Plate permit the setting of the Dresser at any desired angle for production grinding. The Vinco Dresser will save you 75 per cent in dressing costs and eliminate all your worry. It is fully guaranteed to be satisfactory. **Send for Descriptive Circular.**

VINCO TOOL COMPANY

7350 Central Ave. Detroit, Michigan

H. R. KRUEGER & CO.

DETROIT, MICH.

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Manufacturers of

Multiple Drill Heads

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Special High Production Machinery

Exclusive Sales Representatives of

W. F. & JOHN BARNES CO.

Rockford, Illinois

UNIVERSAL COLLET CHUCK

GRIPS AS STRONG AS SOLID STEEL

CONCENTRIC WITHIN .001

FOR END MILLS

UNIVERSAL ENGINEERING CO. FRANKENMUTH, MICH.

YOU'LL SAVE TIME

AND TROUBLE . . . BY SPECIFYING NATIONAL TWIST DRILLS, HOBS, REAMERS . . . MILLING CUTTERS, *Special* TOOLS

NATIONAL TWIST DRILL AND TOOL CO.

DETROIT, U. S. A.

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Factory Branches: New York, Chicago, Philadelphia, Cleveland
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This New 40 Volt Arc Welding will save hundreds of dollars in your plant

30 DAYS TRIAL in your shop at our risk PROVES its your biggest money-making tool

It's Easy to Own!

Don't go another day without getting facts about how little it costs to own this amazing new tool that cuts costs squarely in two in pattern room, tool room, maintenance and production, as well as in jig and die work.

THE NEW HOBART 40 VOLT "SIMPLIFIED" ARC WELDER comes to you on 30 Days Trial—has remote control, current saving motor and features found in no other welder. Costs you less to operate—Handles either the low cost plain or coated rod with greatest of ease on light as well as heavy jobs. The coupon below brings valuable book. Hobart Bros., Box TE-87, Troy, O.

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Hobart Bros., Box TE-87, Troy, Ohio
Gentlemen: Please send me, without obligation, complete details on the new Hobart 40 Volt Arc Welder, also the complete catalog on Easier, more profitable welding.

Name

Address

FREE! IF YOU ARE INTERESTED IN THIS NEW ARC WELDING

ARC WELDIN

Production Perspectives

(Continued from page 48)

All-Metal Universal Joint Company, of Cleveland, O., has been engaged to take charge of the Bendix Automotive Division in Southern California, under the direction of **Palmer Nichols,** who is general supervisor of both aircraft and automotive divisions.

Douglas Aircraft Company, of Santa Monica, Calif., **has been awarded a contract by the War Department for 177 two-engine bombardment planes, to cost approximately $11,651,948. The contract does not include motors,** it was explained by the War Department. **Orders for 354 Wright cyclone engines** will be given as soon as delivery of the new ships begins. The engines will be furnished by **Wright Aeronautical Corporation** at approximately $9000 each.

A huge hydraulic press, said to be the largest ever built of this type, has been installed by the **Hydraulic Press Manufacturing Company** in the plant of the Douglas Aircraft Company at Santa Monica, Calif. **Larger than any press used by automobile concerns in making body stampings,** the machine is 35 feet high, 23 feet long and more than eighteen feet wide. Its base is buried 22 feet below the floor. The press is operated by two 150-horsepower motors and is fully automatic in control. **The rapidly expanding Douglas plant now employs more than 11,000 men in the construction of airplanes,** it was said by **Harry Wetzel,** vice-president and general manager.

John Deere Plow Company of Moline, Ill., has **purchased the Killefer Manufacturing Corporation, Ltd.,** which operates an agricultural implement factory at 5525 Downey Road, Los Angeles, it was revealed by **O. P. Robb,** vice-president and general manager of the Killefer concern. **John Deere will continue to manufacture the Killefer line here,** and will retain the Killefer name and personnel, Robb said.

Mid-West

Most mass production plants are keeping their high pace in plant activities. Continued high retail sales of automobiles has forced a longer continuance of auto plant operation, in a period when new programs have usually been occupying the stage. Lamson & Sessions in Cleveland report a fifty per cent increase of business for the first six months of this year as compared to the same period of last year. Stockholders of Briggs Manufacturing Company rejected a plan whereby the Briggs Company was to acquire the Motor Products Company of Cleveland. They did, however, approve plans to acquire the facilities necessary to manufacture auto body parts that would have been acquired through the merger.

Special High Production Machine

(Continued from page 42)

holes in the work, the machine is automatically stopped. This indicates that a drill has broken or that one or more of the holes have not been finished.

The work is automatically unclamped at the next station, permitting the three parts to drop out of the fixture, as they reach the lowest point on the trunnion. The cycle is now completed and the individual unit advances to the loading station.

The production is approximately 1800 finished parts per hour at 80 percent efficiency.

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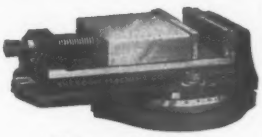
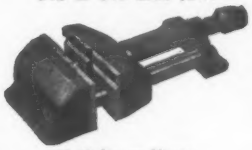
ARBOR PRESSES and VISES

Arbor Presses
12 Sizes
From ¾ to 10 ton Pressure



Plain and Swivel Milling Machine Vises
4 Sizes
3½ to 8½ inch Jaws



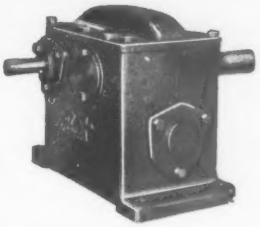
Drill Press Vises
3 Sizes
4½-6½ and 9 inch Jaws

Shaper Vises
2 Sizes
12 and 14 inch Jaws

Ask for No. 25 Catalog and Price List

SHELDON MACHINE CO.
3251 Cottage Grove Ave. Chicago, Ill.

SPEED REDUCERS



Type DW Parallel Drive

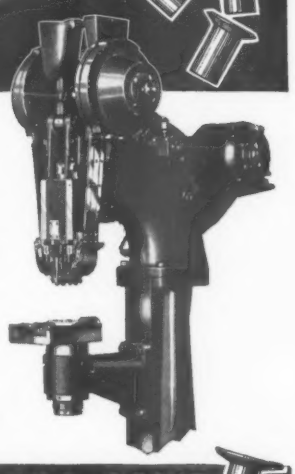
DOUBLE WORM GEAR REDUCER

This unit is one that can be installed and forgotten. The worm shafts, both high speed and intermediate, are of a special alloy steel, hardened and ground. The worm gears are of exceedingly tough nickel bronze. Ratios 23½ to 1 up to 10,000 to 1. Torque 200 to 2500 inch pounds. (Also made in vertical drive.) Other reducers in worm and spur gear types to meet all requirements.

Write for Bulletin 700.

Abart GEAR AND MACHINE CO.
MANUFACTURERS OF
Speed Reducers & Gears
4843 WEST 16TH ST. CHICAGO, ILLINOIS

4 RIVETS SET AT ONE TIME AUTOMATICALLY



● Originally developed for a large car manufacturer, the same application is now available to general industry. It sorts, feeds, inserts and sets 4 rivets with a single pedal operation. STILL LOWER ASSEMBLY COSTS ARE NOW PRACTICAL. Tell us your problems and send sample assembly with inquiry, if possible.

Single, Double, Triple and Quarduple Rivet Setters for Tubular and Split Rivets

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RIVET & MACHINE CO.
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Cicero P. O. Chicago, Ill.

TUBULAR AND SPLIT RIVETS—ALL METALS

ACME

Plain Stationary Press Fit—Type "P"

Shouldered Stationary Press Fit—Type "S"

Removable Slip—Type "R"

Standardized Drill Jig Bushings

Prompt delivery from stock on over 10,900 standard items—over 6700 ACME Standard—over 4200 A. S. A. Standard—all completely finished ready for use. ***Special sizes made to order.***

Made in our new plant by the most exacting and scientific methods—insuring accurate fit plus long wear—concentric within .0003" full indicator reading.

Send for bulletin containing complete data and low prices. Satisfactory service guaranteed.

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Shockless The Ames Shockless Gauge will take more blows at the spindle end, withstand more general rough treatment and retain its original setting and smooth action longer than any other gauge made. For details, send for the Ames Gauge catalogue.

AMES *Shockless* GAUGES

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GAMMONS OF *Manchester*

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ORIGINATORS AND MANUFACTURERS OF HELICAL FLUTED TAPER PIN REAMERS

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Maxi they're Black *Tools*

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Special Tap Orders

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All "GREENFIELD" distributors as well as the Detroit plant carry stocks of regular "GREENFIELD" taps, dies, twist drills and reamers for immediate delivery.

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THE UTILITY SLEEVE

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TOOL DRIVER

CUT SMALL TOOL COSTS

SIMPLE, POWERFUL, POSITIVE, ACCURATE.

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TAPER PIN REAMERS, ETC.

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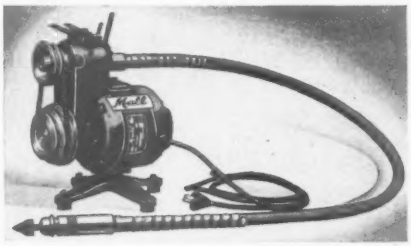
Mall
TRADE MARK

FLEXIBLE SHAFT MACHINES

for tool makers and die makers

A TYPE AND SIZE FOR EVERY JOB!



A MALL four-speed grinder. The ideal machine for operating shaped grinding wheels and rotary files.

MALL grinders are available in types and sizes for each particular grinding job. They save money and time in pattern, die, and mold making, sharpening dies, taps, and other tools. There is a wide variety of uses for MALL machines in every shop.

Write for our catalog and prices. Also, ask for a demonstration, without obligation, on your work.

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Foot Operated Button

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- *For the safe operation of presses.*

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SWEDISH INTERNAL INDICATOR CHECKS BORES FROM ⅜" TO 10" DIA. TO A DEPTH OF 24"

Fast and Accurate
Ideal for use on precision boring, internal grinding and honing operations.

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Exclusive Distributors for
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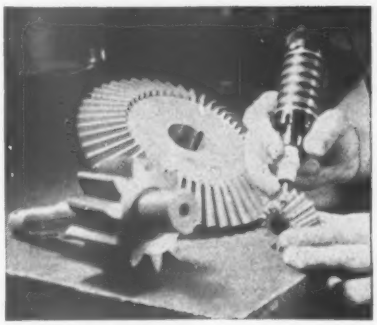
HANDEE TOOL OF 1001 USES

GRINDS . . . DRILLS . . . ENGRAVES . . .
POLISHES . . . SAWS . . . CARVES . . . ROUTS



Here's the wonder tool that is effecting such revolutionary savings in many laboratories, model and tool rooms and on the production lines. Hard-to-get-at places on machines can now be repaired without removing the part or dismantling machine. The Handee uses 200 different accessories, instantly interchangeable, for work on all metals, alloys, bakelite, celluloid, wood, glass, resins and other hard substances.

Finest, speediest, most powerful tool for its type. 25,000 r.p.m. AC or DC, 110 volts. Weighs only 12 ounces. No shop or factory can afford to be without the Handee. Try one.

De Luxe Model **$18.50** post-paid
6 accessories free

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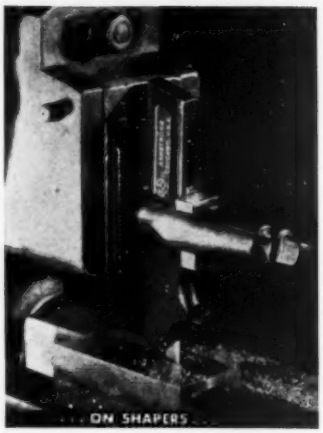
ARMSTRONG

Behind each Armstrong Tool Holder stands the Armstrong System



Alone each ARMSTRONG TOOL HOLDER is equal to a complete set of forged tools for each is a permanent, multi-purpose tool that does innumerable jobs, that can take cutters of many shapes, can be adjusted with a set screw to any clearance. Still, behind each ARMSTRONG TOOL HOLDER stands the complete Armstrong system—Tool Holders of over 100 sizes and shapes—other permanent multi-purpose tools for **every** operation on lathes, planers, slotters and shapers and for standard operations on Turret Lathes and Screw Machines. Each is complementary to the others—all "Save All Forging, 70% Grinding and 90% High Speed Steel."

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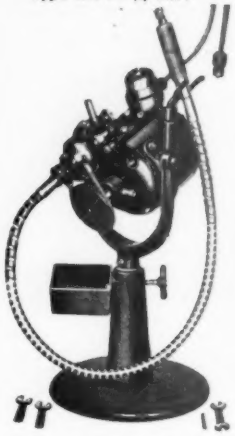
1905 **Strand** 1937

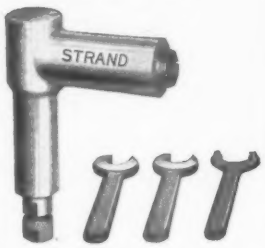
FLEXIBLE SHAFT MACHINES OF HIGH QUALITY

Tool and Diemakers Everywhere Know the quality of "Strand" Machines.

Sixty types and sizes ⅛ to 2 H.P.

Type MY4—¼ H.P.





This Universal Swiveling Machine, our latest development with a right angle hand piece, is in great demand by the tool and die makers. Furnished with speeds of 1700—3000—5200 or 3400—6000—10,400

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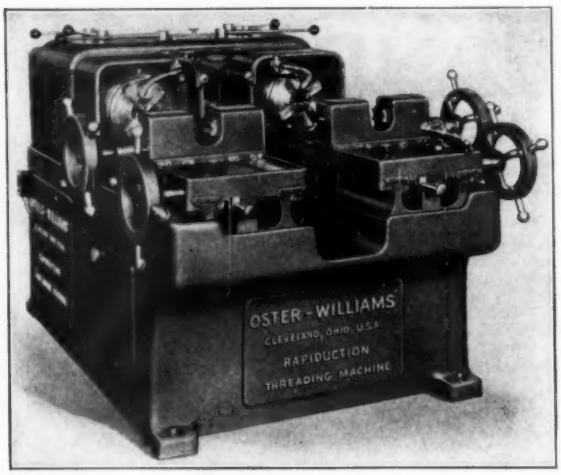
5001 No. Wolcott Ave. **Chicago**



RAPIDUCTION PIPE THREADER

Outstanding in meeting the needs of shops where high production and high quality are essential, the "RAPIDUCTION" gives you a combination of features not obtainable in any other machine on the market. Threading all sizes from 2½" to 8" on one die-head is just one of the many advantages it offers. Write for full details.

OSTER WILLIAMS THREADING EQUIPMENT

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Threading Headquarters Since 1893

Advertisers' Index

Abart Gear and Machine Co. 51
Acme Industrial Co. 51
Ames, B. C., Co. 52
Armstrong Bros. Tool Co. 54
Barber-Colman Co. 37
Besly, Charles H., & Co. 21
Brown & Sharpe Mfg. Co. 35
Bullard Co., The 4 & 5
Carboloy Co., Inc. 35
Chicago Rivet and Machine Co. 51
Chicago Wheel & Mfg. Co. 53
Cincinnati Milling Machine & Cincinnati Grinders, Inc. 1 & 28
Continental Machine Specialties, Inc. 43
Danly Machine Specialties, Inc. 38
Dayton Rogers Mfg. Co. 30
Delta Mfg. Co. 41
Detroit Broach Co. 49
Eclipse Counterbore Co. 39
Ex-Cell-O Corp. 56
Federal Products Corp. 43
Gciring Tool Co., The 34
Gammons-Holman Co., The 52
Glenzer Co., The J. C. 52
Goddard & Goddard Co. 42
Greenfield Tap & Die Corp. 52
Hannifin Mfg. Co. 8
Haynes Stellite Co. 3
Heald Machine Co. 7
Hobart Brothers 50
Jacobs Mfg. Co. 38
Knu Vise Products 41
Krueger & Co., H. R. 49
Landis Tool Co. 27
Logansport Machine, Inc. 32
Mall Tool Co. 53
Morse Tool Co. 29
Morse Twist Drill & Machine Co. 19
National Twist Drill & Tool Co. 50
Odin Universal Engineering Co. 49
O. K. Tool Co. 45
Oster Mfg. Co., The 54
Pratt & Whitney 2
Procunier Safety Chuck Co. 48
Q-C Engineering Products 45
Rivett Lathe & Grinder, Inc. 44
Scully-Jones & Co. 25
Sheffield Gage Corp. 33
Sheldon Machine Co. 51
Standard Pressed Steel Co. 48
Starrett Co., The L. S. 46
Strand & Co., N. A. 54
Sundstrand Machine Tool Co. 23
Swartz Tool Products Co., Inc. 47
Swedish Gage Co. of America 53
Tomkins-Johnson Co., The 53
Universal Engineering Co. 50 & 54
Union Carbide & Carbon Corp. 3
Vanadium Alloys Steel Co. 31
Vinco Tool Co. 49
Weldon Tool Co. 40
Wetmore Reamer Co. 47

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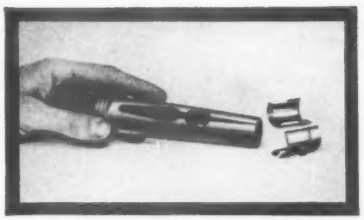

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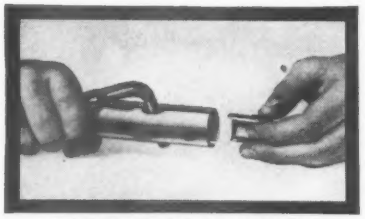

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